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Plant Associations of the Central Oregon Pumice Zone

PLANT ASSOCIATIONS OF THE CENTRAL
OREGON PUMICE ZONE

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Preface

This publication identifies and describes the natural occurring plant associations within the central Oregon pumice deposition zone. A dichotomous vegetation-site key is provided toward the front of the publication to assist administrators and field personnel in on-site identification of the associations. The descriptions are grouped according to similarities in dominant plants and environment. For instance, non-forested associations occur together. The forested associations are grouped by similarity in the dominant trees and shrubs. The productivity data and management considerations are summarized as tables in the Appendix.

In sampling an area as large as central Oregon, the production data can be exceptionally variable for the widely-distributed plant associations. Hopefully, refinement in productivity data will occur at the Forest and District level through project-oriented inventories.

Acknowledgement

The September 1985 revision includes a contribution by the late Mike Panelli entitled Regeneration Opportunities for Lodgepole Pine Communities in the central Oregon Pumice Zone. The paper uses individual plant species and plant associations as predictors of environmental conditions which affect establishment of lodgepole pine seedlings. Mike Panelli's contribution to silviculture in central Oregon is greatly appreciated. This regeneration contribution has been extended to the 1985 revision.

The 1985 revision modifies vegetation-site key to include a series level as well as association level types. A key to succession vegetation has been added to the Appendix. Dr. William E. Hopkins worked closely with the author as these new association keys were being developed.

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ERRATUM

for

Plant Associations of the Central Oregon Pumice Zone

R6-ECOL-104-1982 September 1982

- Page 36A: Plant photo-page change FROM Linanthastrum TO granitigila
- Page 39: Silviculture: Natural regeneration difficult to establish with presence of CHANGE lodgepole pine TO Idaho fescue.
- Page 40: Silviculture: Natural regeneration difficult to establish except near CHANGE seedwalls TO clearcut margins.
- Page 42: Dominants: Bitterbrush 0-10
Ground Vegetation: Bitterbrush strongly aggregated to CHANGE shrub TO tree understory.
- Page 46: Revegetation: Remove mountain brome from list since species is highly preferred by pocket gophers.
Indicators: FROM Graycoys penstemon TO Glaucous penstemon.
- Page 47: Dominants: FROM Graycoys penstemon TO Glaucous penstemon.
- Page 49: Revegetation: remove mountain brome from list since species is highly preferred by pocket gophers.
- Page 52: Ground Vegetation: FROM Graycoys penstemon TO Glaucous penstemon.
- Page 57: Ground Vegetation: FROM low pensten TO low penstemon.
- Page 59: Revegetation: remove mountain brome from list since species is highly preferred by pocket gophers.
- Page 62: Ground Vegetation: include incense cedar along with lodgepole or white fir as being present in some stands.
- Page 66: Revegetation: remove mountain brome from list since species is highly preferred by pocket gophers.
- Page 68: Ground Vegetation: FROM Graycoys penstemon TO Glaucous penstemon.
Revegetation: ADD the statement: smooth brome not recommended where have gophers.
- Page 70: Ground Vegetation: FROM Graycoys penstemon TO Glaucous penstemon.
Also change to glaucous penstemon on plant-photo page.
- Page 71: Dominants: FROM Graycoys penstemon TO Glaucous penstemon. Also change to glaucous penstemon on plant photo page.
- Page 73: Silviculture: FROM Natural regeneration common. TO Natural regeneration usually common on gentle slopes but difficult to establish on steep escarpment slopes which have coluvial movement of pumice.
- Pages 81, 86-88: Juniper/bitterbrush/bunchgrass FROM CJ-53-11 TO CJ-S3-11.
- Pages 83, 90, 94, 98, 101: Lodgepole/grouse huckleberry FROM CL-S4-16 TO CL-S4-12.
- Pages 94, 95, 96: ADD following statement under foot note (2) Revegetation: Smooth or mountain brome not recommended where pocket gophers are a management problem.
- Page 100: Mixed conifer/snowberry/forb: recommended precommercial stocking level for 6" ave. dbh is approximately 700 TPA.

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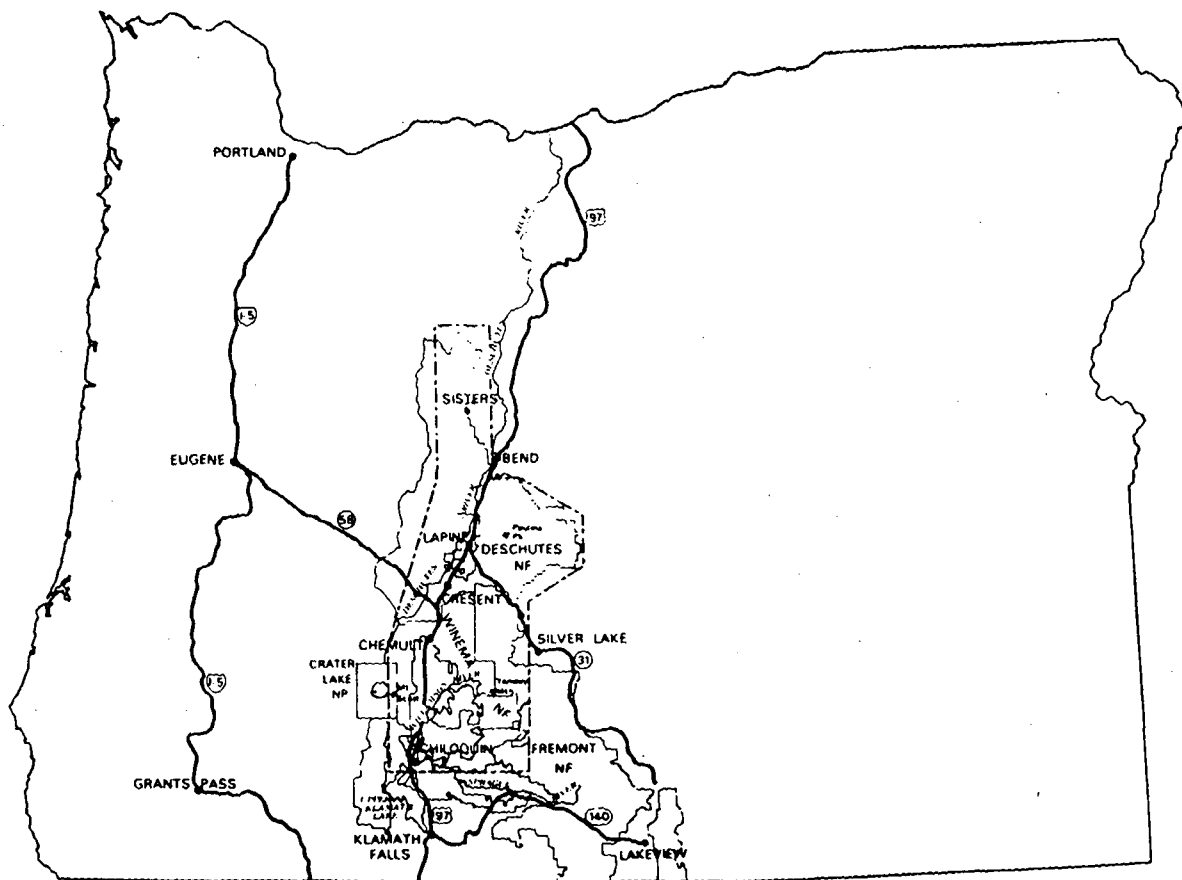
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Map of Oregon showing major highways, towns and National Forests within central Oregon pumice deposition zone. The study area is indicated by a dashed line. Map scale is 1:3041280.

INTRODUCTION

General Discussion

The central Oregon pumice zone comprises approximately 2,780,000 acres within the Deschutes, Fremont, and Winema National Forests. The 62 plant communities described in this paper occur within an area extending from the Sprague River (latitude 42° 32') on the south to the Warm Springs Indian Reservation (latitude 44° 40') on the north and between the Cascade Mountains, exclusive of wilderness, on the west and an imaginary north-south line between Sycan Marsh, Silver Lake, and Fort Rock, Oregon at approximately 121° 5' longitude on the east.

The topography of central Oregon strongly reflects the results of its volcanic history. Broad basins from basalt flows are dotted with numerous cinder cones and volcanic domes. Stepped benches from old basalt flows and fault scarp ridges are also common. Geologic water erosion since late Pleistocene produced localized alluvial fans and terraces along the Cascade Mountains. The entire area is blanketed by recent pumice eruptions from Mt. Mazama, Newberry Caldera and other less significant sources. Mazama dacite pumice occurs as two deposits: airborne pumice followed by overland flow pumice. A basic scoria flow occurred after the pumice flow. The more recent Newberry deposit is composed of airborne rhyolite pumice. Communities described for this deposit use a (rhyolite) modifier in their nomenclature. In the Sisters area volcanic sand and scoria deposits from Nash Crater and the Blue Lake vent overlay Mazama pumice.

Several environmental gradients occur within the central Oregon pumice zone which lends variability in floristics and productivity within and between plant associations. A precipitation gradient occurs from the Cascades eastward to the desert-forest ecotone. An edaphic gradient occurs in the Mazama pumice deposits north and eastward from their source (Crater Lake) as particle sizes and deposition depths decrease. Microclimate gradients occur with local changes in topographic positions. Depositions of pumice or reworked material over various underlying materials adds diversity to area-wide and localized gradients not expected from more uniform parent materials.

Classification Concept

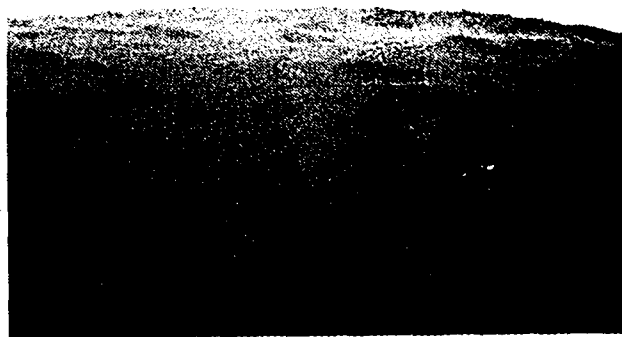
Plant communities of the western United States are usually classified using either a continuum or discrete (habitat type) philosophy. For this study a continuum in environment and climax vegetation over space, as described by Hall (1970), has been assumed. Field sampling was conducted so the geographic variability in climate, topography, soil, and vegetation was represented within the data. Statistical analysis of the data included both ordination and classification approaches for identifying communities.

The plant communities were either grouped or remained as separate entities depending upon their response to land management. These classified "response units" are designated plant associations. The plant association provides the ecological basis for management-oriented guidelines related to range condition and trend, tree stockability, silviculture, successional trends, and vegetative mapping. Each response unit must meet the following four criteria before being classified as a association: 1) The type differs from all other types in opportunities and limitations to land management. 2) The type can be recognized on the ground in any stage of disturbance. 3) The type has limited variability in species composition. 4) The type should have limited variability in productivity. Generally the associations represent plant communities which can be recognized within the rotation age of the major tree dominant. Seral communities resulting from site disturbance are usually not described. The response characteristics of a certain species in the shrub and herbaceous layer are given for each community.

Plant associations for the central Oregon pumice zone will represent communities found in the field about 70% of the time. Occasionally associations will appear mixed together because of localized environmental gradients related to landform and soils, or the resolution required of the investigator. Mixed types are especially a problem with certain kinds of mapping. When mixes are encountered, the properties of the mixed communities should be considered and the resulting amalgamation interpreted in light of management needs. An example of pure and mixed types occurs in the ponderosa forest savanna of central Oregon. The pure ponderosa/bitterbrush/fescue of lower elevations intergrades with the upslope pure ponderosa/bitterbrush/needlegrass as effective soil moisture and pumice depth increase with distance from the desert-forest ecotone.



Aerial view of Walker Rim, a prominent fault scarp to northeast of Chemult, Oregon. Flat topography dominated by lodgepole pine communities. Escarpments and buttes are ponderosa pine or mixed conifer types.



Aerial view of broadly undulating topography dotted with cinder cones to southeast of Bend, Oregon. Flatter ground in foreground dominated by ponderosa pine and Idaho fescue grading into lodgepole pine communities in mid and background. Cinder cones predominately ponderosa pine.

Community Description Codes and Criteria

Community Name and Number: Each association is given a name and a code number. The name is composed of the dominant species of the tree, shrub, and herbaceous layer. The species having the greatest presence across all stands representing the association is used in the nomenclature. A slash (/) in the nomenclature separated species of different lifeform while a dash (-) separates those of similar lifeform. The code number is described in codes for Pacific Northwest Ecoclass Vegetation Classification, R6-ECOL 79-002. The code is designed for TRI System use, as an identifier for data retrieval and analysis, as the type designator in mapping, or for other uses when an abbreviation is required.

Taxonomic Nomenclature and Authority: Common names are used exclusively throughout the community descriptions. Scientific names are given in the species list, see Appendix. Taxonomic authority for scientific names is Hitchcock et.al (1955, 1959, 1961, 1964, 1969); common names follow Garrison et.al. (1967) and occasionally Peck (1961) when not listed in the prior authority.

Environment and Soils: Notations are given in feet and inches except soil particle size which is in millimeters. Values which occur outside the usual range of data we noted in (). The slash (/) in geology descriptions implies a discontinuity in soil materials i.e., pumice/basalt flow indicates a pumice overburden lying discontinuous over a basalt flow. Coarse fragments are soil particles greater than 2mm diameter and were determined by sieving. Soil particle sizes are the most frequently occurring sizes for profiles representing a particular community. Pumice soils have less than or equal to 4mm particle size are called ash. Those greater than 4mm are called pumice. When ash is not used as modifier pumice sizes are implied. The Al+AC horizon is that portion of pumice soil which represents morphologic development. The C horizon designates the unweathered parent material usually pumice in this case. The A2 horizon is a horizon of leaching found intermittently in high elevation profiles. Rooting depth is the depth to which trees and shrubs root, or herbaceous species in the case of meadows or grasslands. Buried Soil depth is the depth at which a buried soil profile is encountered and gives one an indication of the pumice over-burden depth. Hydrophobic is defined as the ability to resist wetting. Size controls on photographs is given in meters (M) and decimeters (dm).

Vegetation: Dominants are those plants, expressed by percent crown cover, characteristically dominating the community under good range conditions (ground vegetation) and those trees which are most commonly dominant under average unlogged stand conditions. A I indicates an average quantity less than 1% canopy cover. The cover value for trees refers to the overstory canopy only, except where otherwise noted. Average stand conditions do not always represent climax forest dominants; note plant status in the "Status" column.

Status: A decreaser is a plant so palatable that it is the first to decrease under excessive grazing or site disturbance. An increaser is a plant low in palatability which tends to increase in numbers or relative dominance under heavy grazing or site disturbance. The decreaser-increaser designation is used for shrub and herbaceous species. The trees are designated as either seral (successional) or climax depending upon their ability to successfully regenerate themselves under minimum stand disturbance. Seral species are the most aggressive immediately following logging, burning, or catastrophic windthrow, but their regeneration potential declines as environmental conditions again stabilize to the prevailing climatic, edaphic, or topographic norms. High-low suggests the species position in the succession process; high implies late succession, low implies early succession. Major-minor suggest the relative dominance of the species in a stabilized climax state; major implies the stand dominant, minor implies a subordinate or weak codominant position. Absence of key indicator species may occur in mixed conifer stands having complete canopy closure in which case refer to roadside disturbed sites for presence of indicators.

Productivity (forested type 1/): Forage is the air-dry pounds per acre, in good range condition, of all grasses and forbs; no allowance is made for proper use factors: Site Index (SI) is based on average height of dominants at age 100 for ponderosa pine (PP), Douglas-fir (DF), white fir (WF), Engelmann spruce (ES), Shasta red fir (SRF), lodgepole pine (LP), or mountain hemlock (MH). Refer to literature cited for source of site index tables. TBA is total basal area of the stand in square feet/acre. GBA10 is growth basal area or that basal area at which

1/ Lodgepole pine productivity data for the Fremont National Forest was provided by Dr. William Hopkins, Ecologist, US Forest Service.

crop trees (dominants) grow 10/20ths of an inch (20 rings per inch) in radius at diameter breast height. GBA10 is given for site index species unless noted and has not been age corrected. Cu. ft./yr Index is a relative measure of cubic volume for the community which may not be attained under management. The index does not consider stem mortality. The equation is $SI/10 \times GBA15/10 \times .55$ derived for ponderosa pine by F. C. Hall (1973). The equation was also applied to lodgepole pine and Douglas-fir data. The volume growth data should only be used as a relative measure of productivity between communities described in the publication. Mean is the average for the type. Std Error is the standard error around the sample mean. 5% CI is the confidence interval at the 95% probability level i.e., a mean site index value of 82 and 5% CI of 8 suggests a stand within that association can have a site index between 74 and 90 or 82 ± 8 , ninety-five times out of one hundred. The 95% probability figure is strongly affected by sample size. In some instances the data is too variable for the sample size so no meaningful 5% CI is provided.

Characteristics (non-forest types): Each item represents data for good forage condition unless otherwise noted. BG+P is bareground and natural occurring pavement less than .75 inch in diameter. Surface Rock is gravels and stones exceeding .75 inch in diameter which lie on soil surface. Total hits are the average number of times a perennial plant occurred within a .75 inch diameter loop placed 100 times along a linear transect with the loop frequency sampling method; data is given only for meadow communities. Cover estimates are from 9.6 sq. ft. circular plots in shrub types and .96 sq. ft. plots in meadows.

Data Revisions

The September 1982 revision includes data collected by Dr. Hopkins for several associations occurring on pumice derived soils from south Chiloquin, Klamath Ranger Districts of the Winema NF and the Frenont NF. These associations are SD29-12, CPS1-11, CPS2-11, CPS2-17, CPS2-12, CWS1-12, CWS1-11. Descriptions for these associations have been correlated between ecological areas.

Additional revisions include conversion of all GBA data from 15 rings per inch to a 20 rings per inch or 10/20 inch radius growth standard using formula $(GBA15)(1.27)=GBA10$. The vegetation - site key has been expanded to include vegetation southeast of the Sycan River.

VEGETATION-SITE KEY TO PLANT ASSOCIATIONS WITHIN THE PUMICE DEPOSITION
ZONE: DESCHUTES, FREMONT, WINEMA NATIONAL FORESTS

CONCEPTUAL CONSIDERATIONS

The vegetation-site key which follows is used to identify plant associations within the pumice deposition zone of central Oregon. Plant associations are abstract classification units comprised of plant communities that would become established under current environmental conditions if all successional sequences progressed without human intervention (FSM 2060). The key is entered at the series level of classification. The series is an abstract classification unit which includes all plant associations dominated by the same tree species as succession stabilizes toward climax. Once the dominant tree species are determined, the user is referred to an appropriate key that identifies associations found within the series.

Each plant community described within this publication is identified as to either an association or a community type. The community type is also an abstract collection of stands which have similar structure, species composition, productivity potential and management significance but whose seral status has not been established. For example, nomenclature designated as Mixed Conifer (Ponderosa pine) in this key indicates those sites presently dominated by ponderosa pine but where potential dominance will be white fir in the absence of a catastrophic disturbance as fire, logging or severe overgrazing. The Mixed Conifer (Ponderosa pine) stands are given community type status in the ponderosa pine key and association status in the white fir key.

USE OF THE KEYS

It is important to initially enter the key at the series level and then proceed to the appropriate association key. Gross errors in identification will occur if this procedure is not followed. Walk across an area of at least 1/10 acre in size (37 foot radius circle) noting the dominant species in the tree, shrub and herbaceous layers. The best estimates come from least-disturbed portions of the stand and areas with less than 40% tree canopies. If either criteria can not be met, increase the observation area to 1/2 or 1 acre. Occasionally indicator species are not prevalent following recent disturbance or in stands with dense tree canopies. The key to seral vegetation (see Appendix) should be used if stands have been heavily logged, burned or grazed within the last 20 to 30 years. Once an association or two is chosen, use the association descriptions as a way to verify your decision and select the best fit for the stand conditions presented.

Scientific names are listed in Appendix for all common names used in the key. The key is constructed so the two decisions necessary at a given level are identified by the same numeral. Tree species listed in parenthesis within community nomenclature will appear as stand dominants in the field.

SERIES-LEVEL KEY TO PLANT ASSOCIATIONS OF CENTRAL OREGON

- 1a. Site dominated by nonforest vegetation or tree stumps not evident.
Physiognomy is shrubland or grassland without tree stumps evident. p. 6

- 1b. Site either dominated by forest vegetation or tree stumps apparent.

- 2a. Forestlands above 5100 feet elevation with mountain hemlock present as overstory and/or at least 5% crown cover in understory. Whitebark pine, subalpine fir, western white pine, Shasta red fir and/or lodgepole pine can be present.

Mountain hemlock Series p. 16

- 2b. Mountain hemlock absent or less than 5% understory canopy cover. Other conifers dominate the tree layer. Stands generally below 6000 feet elevation.

- 3a. Shasta red fir present in the overstory and understory with at least 5% canopy cover in each layer. Western white pine, white fir, mountain hemlock, sugar pine, ponderosa pine and/or lodgepole pine can be present.

Shasta red fir Series p. 16

- 3b. Shasta red fir either absent in tree layer or with less than 5% canopy coverage.

- 4a. White fir present in either the overstory or understory with at least 5% canopy cover or 5 trees per acre for each layer. Ponderosa pine, lodgepole pine, sugar pine, Douglas-fir, incense cedar, Pacific silver fir or Engelmann spruce can be present and dominate in either layer.

White fir Series p. 14

- 4b. White fir absent in overstory or less than either 5% canopy coverage or 5 trees per acre in understory.

- 5a. Ponderosa pine dominates in the overstory or understory with at least 5% canopy cover. More mesic species as Shasta red fir or white fir are either absent or represented by less than 5 trees per acre in understory. Western juniper has less than 20 seedlings or trees per acre. Lodgepole pine, if present, has less than 20% canopy cover in either layer.

Ponderosa pine Series p. 11

- 5b. Ponderosa pine absent in overstory or less than 5% canopy cover in either overstory or understory.

- 6a. Lodgepole pine either the sole layer dominant or other tree species as ponderosa pine, western juniper, white fir, mountain hemlock, Pacific silver fir have less than 5% canopy coverage in either tree layers.

Lodgepole pine Series p. 8

- 6b. Lodgepole pine absent or less than either 5% canopy cover in understory and overstory or 5 trees per acre in either layer.

- 7a. Western juniper with basal areas of overstory trees greater than 10 sq. feet per acre or canopy cover greater than 5% in either layer.

Western juniper Series
Juniper/bitterbrush/bunchgrass
Association
CJ53-11 p. 31

- 7b. Western juniper does not meet above criteria. Refer to nonforest vegetation key. p. 6

PLANT ASSOCIATION KEY FOR NON-FOREST VEGETATION

1a. Herbaceous lifeform dominates. Shrubs can be present under deteriorated range conditions or within the riparian zone. Refer to the seral key in Appendix for identification of associations found within harvest units and other disturbance.

2a. Sedge and rushes dominate over grasses. Water standing on or within three feet of soil surface through mid-summer.

Wet meadow
Community type
MW p. 20

2b. Grasses and forbs prevalent over sedges and rushes. Soil surface moist to dry by mid-summer. Water tables absent or below 3 feet by mid-summer.

3a. Kentucky bluegrass common.

Moist (bluegrass) meadow
Community type
MM-90 p. 22

3b. Kentucky bluegrass absent or very subordinate.

4a. Codominance of tufted hairgrass with northern reedgrass or moist-tending sedges. Bunch form of bluegrasses absent.

Moist (hairgrass) meadow
Community type
MM-19 p. 21

4b. Tufted hairgrass, northern reedgrass and moist-tending sedges absent. Bunch form of bluegrasses present.

5a. Site characterized by lower to upper-third slope positions of ridges, benches or escarpments. Surface rock common.

6a. Soils shallow to moderately deep and stoney. Remnant bunchgrasses as bluebunch wheatgrass, Idaho fescue, needlegrass, and/or squirreltail usually present.

Recently disturbed sagebrush sites
(Refer to seral key in Appendix)

6b. Soils very shallow. Sandberg or Nevada bluegrass associated with one-spike oatgrass. Prominence of annual forbs and biscuitroot in degenerated condition.

Bluegrass scabland
Association
GB-99 p. 24

5b. Site characterized by bottom slope positions of drainages or basins. Surface rock absent or occasional.

Dry meadow
Community type
MD19-11 p. 23

1b. Herbaceous lifeform subordinate to the shrub layer except when shrubs destroyed through conflagration fire, herbicides, or reseeding treatments. Site usually well drained by late spring-early summer.

7a. Sagebrush dominate member of shrub layer.

8a. Low sagebrush dominates the shrub layer.

Low sagebrush/fescue
Association
SD19-12 p. 25

8b. Low sagebrush absent or very subordinate.

9a. Bluebunch wheatgrass and/or Idaho fescue present. Soils with little or no Newberry rhyolite pumice on surface.

10a. Bitterbrush present as codominant or subordinate to sagebrush.

Big sagebrush-bitterbrush/
bunchgrass
Association
SD29-13 p. 28

10b. Bitterbrush absent.

Big sagebrush/bunchgrass
Association
SD29-12 p. 26

9b. Bluebunch wheatgrass and Idaho fescue absent. Soil developed from Newberry rhyolite pumice, these gray-white gravels on surface.

Big sagebrush/needlegrass
(rhyolite)
Association
SD29-14 p. 27

7b. Sagebrush absent or nearly so.

11a. Bitterbrush dominant member of shrub layer.

Bitterbrush/needlegrass-sedge
Association
SD33-11 p. 29

11b. Bitterbrush absent or very subordinate to other shrubs.

12a. Snowbrush and/or greenleaf manzanita common. Soils derived from Mazama dacite pumice.

Brushfields (forest site)
SC
(Refer to seral key in Appendix)

12b. Snowbrush and/or manzanita absent.

13a. Willows common. Soils alluvial or organic in nature.

(Refer to riparian classification
for area)

13b. Willows absent. Buckwheat and horsebrush common. Soils have Newberry rhyolite pumice on surface.

Buckwheat flats (rhyolite)
Association
SD93-23 p. 30

PLANT ASSOCIATION KEY FOR LODGEPOLE PINE SERIES

1a. Bitterbrush at least 5% crown cover, usually dominates shrub layer.

2a. Idaho fescue obviously present.

Lodgepole/bitterbrush/fescue
Association
CLS2-14 p. 39

2b. Idaho fescue very rare, most often absent.

3a. Long-stolon sedge present, dominates herbaceous layer over other sedges and grasses.

Lodgepole/bitterbrush/sedge
Association
CLS2-12 p. 44

3b. Long-stolon sedge very rare, most often absent.

4a. Squaw currant at least 5% crown cover.

Lodgepole/currant-bitterbrush/
needlegrass
Community type
CLS2-15 p. 41

4b. Squaw currant less than 5% crown cover or absent.

5a. Soil parent material is rhyolite pumice lying east of Newberry Caldera, gray-white pumice gravels on surface.

Lodgepole/bitterbrush (rhyolite)
Association
CLS2-16 p. 38

5b. Soil parent material from Mazama air laid pumice or reworked pumice of any source, pumice gravels buff yellow to brown.

6a. Strawberry or any two of following species present: western yarrow, tawny horkelia, small-flower penstemon. Site imperfectly or poorly drained through early summer, grey soil colors prevalent. Slopes less than 5%, flat to concave basins or drainages.

Lodgepole/bitterbrush/forb
Association
CLS2-13 p. 35

6b. Strawberry or any two of following species absent: western yarrow, tawny horkelia and small-flower penstemon. Site well drained in summer, soil colors pale yellow to brown. Slopes and topography various.

Lodgepole/bitterbrush/
needlegrass
Association
CLS2-11 p. 40

1b. Bitterbrush less than 5% crown cover or absent.

7a. Bearberry at least 5% crown cover.

Lodgepole/bearberry
Association
CLM2-11 p. 34

7b. Bearberry less than 5% crown cover or absent.

8a. Ground vegetation comprised of either wetland shrubs or meadow sedges and grasses.

9a. Spirea, bog and low huckleberry and/or honeysuckles present.

Lodgepole/blueberry wetland
Association
CLM3-11 p. 33

9b. Spirea, bog and low huckleberry, and/or honeysuckles absent.

10a. Northern reedgrass, blue wildrye, slender bog sedge and/or
Nebraska sedge present.

Lodgepole/sedge-grass wetland
Association
CLM1-11 p. 32

10b. Northern reedgrass, blue wildrye, slender bog sedge and/or
Nebraska sedge absent.

Lodgepole pine invasion into
meadow sites
CLM9

8b. Ground vegetation not comprised of wetland shrubs or meadow sedges
and grasses.

11a. Snowbrush at least 3% canopy cover.

Lodgepole/snowbrush-manzanita
Community type
CLS9-11 p. 45

11b. Snowbrush absent or less than 3% cover.

12a. Pinemat and/or greenleaf manzanita present with at least 5%
cover for each species.

Lodgepole/manzanita
Association
CLS3-11 p. 50

12b. Pinemat and/or greenleaf manzanita very subordinate to other
shrubs or absent.

13a. Grouse huckleberry present.

Lodgepole/grouse huckleberry
Community type
CLS4-12 p. 51

13b. Grouse huckleberry absent.

14a. Big sagebrush present.

15a. Idaho fescue present. Rhyolite pumice lying east of
Newberry Caldera is less than 6 inches thick, if pre-
sent at all.

Lodgepole/sagebrush/fescue
Association
CLS1-11 p. 37

15b. Idaho fescue absent. Rhyolite pumice lying east of
Newberry Caldera is greater than 6 inches thick.

Lodgepole/sagebrush (rhyolite)
Association
CLS1-12 p. 36

14b. Big sagebrush absent.

16a. Idaho fescue present.

Lodgepole/fescue
Community type
CLG3-12 p. 39

(This community was probably
CLS2-14 in the absence of
either underburning and/or
overgrazing by domestic live-
stock which have significantly
reduced the shrub component.)

16b. Idaho fescue absent.

17a. Beargrass present.

Lodgepole/beargrass
Association
CLM4-11 p. 52

17b. Beargrass absent.

18a. Long-stolon sedge present.

19a. Silvery or Anderson lupine present.

20a. Glaucous (Graycoys) penstemon present.

Lodgepole/sedge-lupine-
penstemon
Community type
CLG4-12 p. 47

20b. Glaucous (Graycoys) penstemon absent.

Lodgepole/sedge-lupine
Association
CLG4-11 p. 46

19b. Silvery and Anderson lupine absent.

21a. Tailcup lupine common.

22a. Linanthastrum present.

Lodgepole/needlegrass-lupine-
linanthastrum
Association
CLG3-13 p. 49

22b. Linanthastrum absent.

Lodgepole/needlegrass-lupine
Association
CLG3-14 p. 48

21b. Tailcup lupine rare or absent.

Lodgepole/sedge-needlegrass
basins
Association
CLG4-13 p. 43

18b. Long-stolon sedge absent.

Lodgepole/needlegrass basins
Association
CLG3-11 p. 42

PLANT ASSOCIATION KEY FOR PONDEROSA PINE SERIES

- 1a. Woolly wyethia present, stands restricted to Black Hills, Bly RD.

Ponderosa pine/wooly wyethia
Association
CPF1-11 p. 60a

- 1b. Woolly wyethia absent, stands have more general distribution.

- 2a. Idaho fescue at least 5% crown cover.

- 3a. Bitterbrush present.

- 4a. Big sagebrush present.

Ponderosa/bitterbrush-sagebrush/
fescue
Association
CPS1-11 p. 56

- 4b. Big sagebrush absent.

- 5a. Bluebunch wheatgrass present.

Ponderosa/bitterbrush/bunchgrass
Association
CPS2-16 p. 53

- 5b. Bluebunch wheatgrass absent.

- 6a. Snowbrush at least 3% crown cover.

Ponderosa/bitterbrush-snowbrush/
fescue
Association
CPS3-14 p. 59

- 6b. Snowbrush less than 3% crown cover or absent.

- 7a. Greenleaf manzanita at least 1% crown cover.

Ponderosa/bitterbrush-manzanita/
fescue
Association
CPS2-17 p. 58

- 7b. Greenleaf manzanita less than 1% crown cover or absent.

Ponderosa/bitterbrush/fescue
Association
CPS2-11 p. 57

- 3b. Bitterbrush absent.

- 8a. Long-stolon sedge and thickleaf peavine present. Stands restricted to Sisters RD.

Ponderosa/sedge-fescue-peavine
Association
CPG2-12 p. 66

- 8b. Long-stolon sedge and thickleaf peavine absent. Stands have more general distribution.

Ponderosa/fescue
Community type
CPG3-11 p. 57

- 2b. Idaho fescue less than 5% crown cover.

9a. Long-stolon sedge at least 2% crown cover and dominates over western needlegrass, squirreltail and/or Ross sedge.

10a. Bitterbrush present. Stands located on Chemult RD in vicinity of Crater Lake NP.

11a. Greenleaf manzanita at least 1% crown cover.

12a. Snowbrush at least 3% crown cover.

Ponderosa/bitterbrush-snowbrush/
sedge
Association
CPS3-12 p. 65

12b. Snowbrush less than 3% crown cover or absent.

Ponderosa/bitterbrush-manzanita/
sedge
Association
CPS2-14 p. 64

11b. Greenleaf manzanita less than 1% crown cover or absent.

Ponderosa/bitterbrush/sedge
Association
CPS2-15 p. 63

10b. Bitterbrush absent. Stands located on Sisters and Bend RD.

13a. Snowbrush at least 1% crown cover.

14a. Brackenfern at least 5% crown cover.

Mixed conifer(ponderosa)/snowbrush/
sedge-brackenfern
Community type
CWC2-13 p. 69

14b. Brackenfern less than 5% crown cover.

15a. Glaucous (Claycoys) penstemon present.

Mixed conifer(ponderosa)/manzanita-
snowbrush/sedge-penstemon
Community type
CWS1-13 p. 71

15b. Glaucous (Claycoys) penstemon absent.

Mixed conifer(ponderosa)/snowbrush/
sedge
Community type
CWS1-15 p. 68

13b. Snowbrush less than 1% crown cover.

Ponderosa/sedge-fescue-peavine
Association
CPC2-12 p. 66

9b. Long-stolon sedge absent or less than 2% crown cover. Western needlegrass, squirreltail and/or Ross sedge codominants.

16a. Bitterbrush exceeds 3% crown cover.

17a. Soil parent material is rhyolite pumice lying east of Newberry Caldera, Ft. Rock RD. White-gray pumice gravels on soil surface.

18a. Big sagebrush at least 2% crown cover.

Ponderosa/bitterbrush-sagebrush/
squirreltail (rhyolite)
Association
CPS1-12 p. 55

18b. Big sagebrush less than 2% crown cover or absent.

Ponderosa/bitterbrush/squirreltail
(rhyolite)
Association
CPS2-18 p. 54

17b. Soil parent material from Mazama air-laid pumice or reworked
pumice of any source. Buff yellow gravels on soil surface.

19a. Greenleaf manzanita at least 5% crown cover.

Ponderosa/bitterbrush-manzanita/
needlegrass
Association
CPS2-13 p. 61

19b. Greenleaf manzanita less than 5% crown cover or absent.

20a. Snowbrush present.

Ponderosa/bitterbrush-snowbrush/
needlegrass
Association
CPS3-11 p. 62

20b. Snowbrush absent.

Ponderosa/bitterbrush/needlegrass
Association
CPS2-12 p. 60

16b. Bitterbrush absent or less than 3% crown cover.

21a. Pinegrass present. Stands found commonly on Sisters RD and
less so on Bend RD.

22a. Snowberry at least 2% crown cover, any two of following
shrubs absent: snowbrush, chinkquapin, greenleaf manzanita.

Mixed conifer(ponderosa)/snowberry/
pinegrass
Community type
CDS6-14 p. 76

22b. Snowberry absent or less than 2% crown cover, any two of
following shrubs present: snowbrush, chinkquapin, greenleaf
manzanita.

Mixed conifer(ponderosa)/
snowbrush-chinkquapin/pinegrass
Community type
CWC2-12 p. 74

21b. Pinegrass absent. Location various.

23a. Brackenfern present. Stands found on Sisters and Bend RD.

Mixed conifer(ponderosa)/
snowbrush/sedge-brackenfern
Community type
CWC1-13 p. 69

23b. Brackenfern absent. Stands found throughout pumice zone.

24a. Chinkapin at least 3% crown cover.

Mixed conifer(ponderosa)/
snowbrush-chinkapin
Community type
CWH1-11 p. 73

24b. Chinkapin absent or less than 3% crown cover.

25a. Pinemat manzanita present. Stands generally above
5400 feet elevation.

Mixed conifer(ponderosa)/
snowbrush
Community type
CWS1-14 p. 67

25b. Pinemat manzanita absent. Elevation generally below
5900 feet.

26a. Greenleaf manzanita at least 5% crown cover.

Mixed conifer(ponderosa)/
snowbrush-manzanita
Community type
CWS1-12 p. 70

26b. Greenleaf manzanita less than 5% crown cover.

Ponderosa/bitterbrush-snowbrush/
needlegrass
Association
CPS3-11 p. 62

PLANT ASSOCIATION KEY FOR WHITE FIR SERIES

1a. Brackenfern present.

2a. Golden chinkapin present.

Mixed conifer/snowbrush-chinkapin/
brackenfern
Association
CWC2-11 p. 75

2b. Golden chinkapin absent.

Mixed conifer/snowbrush/sedge-
brackenfern
Association
CWC2-13 p. 69

1b. Brackenfern absent.

3a. Pinegrass at least 2% crown cover.

4a. Snowberry at least 2% cover, any two of following shrubs absent:
snowbrush, greenleaf manzanita, golden chinkapin.

Mixed conifer/snowbrush-chinkapin/
pinegrass
Association
CWC2-12 p. 74

4b. Snowberry absent or less than 2% cover, any two of following
shrubs present: snowbrush, greenleaf manzanita, golden chinkapin.

Mixed conifer/snowberry/pinegrass
Association
CDS6-14 p. 76

3b. Pinegrass less than 2% crown cover, or absent.

5a. Long-stolon sedge present.

6a. Glaucous (Graycoys) penstemon present.

Mixed conifer/snowbrush-manzanita/
sedge-penstemon
Association
CWS1-13 p. 71

6b. Glaucous (Graycoys) penstemon absent.

Mixed conifer/snowbrush/sedge
Association
CWS1-15 p. 68

5b. Long-stolon sedge absent.

7a. Trailing blackberry present.

8a. Twinflower at least 3% crown cover and strawberry usually present.

Mixed conifer/snowberry/twinflower
flatlands
Association
CDS6-12 p. 78

8b. Twinflower absent or less than 3% crown cover, strawberry absent.

Mixed conifer/snowberry/forb
Association
CDS6-13 p. 77

7b. Trailing blackberry absent.

9a. Engelmann spruce present in either tree overstory or understory, and queencup beadlelily present.

Engelmann spruce bottomlands
Community Type
CWS9-11 p. 79

9b. Engelmann spruce and queencup beadlelily absent.

10a. Golden chinkapin at least 3 percent crown cover.

Mixed conifer/snowbrush-chinkapin
Association
CWH1-11 p. 73

10b. Golden chinkapin less than 3 percent crown cover or absent.

11a. Pinemat manzanita present or greenleaf manzanita less than 3 percent crown cover. Stands generally above 5700-5800 feet elevation.

12a. Snowbrush present.

Mixed conifer/snowbrush
Association
CWS1-14 p. 67

12b. Snowbrush absent. White fir rarely present, refer to Shasta red fir series key.

Mixed conifer/manzanita
Association
CWS1-11 p. 72

- 11b. Pinemat manzanita absent and greenleaf manzanita at least 3 percent crown cover. Stands generally below 5700 feet elevation.

Mixed conifer/snowbrush-manzanita
Association
CWS1-12 p. 70

PLANT ASSOCIATION KEY FOR MOUNTAIN HEMLOCK SERIES

- 1a. Grouse huckleberry present. Xeric sites generally above 5200 feet elevation in the Cascade Mts. Greenleaf and pinemat manzanita restricted to ridgelines and rock outcrop areas if present at all.
- 2a. Lodgepole pine either dominates tree overstory with at least 20% canopy coverage or lodgepole pine stumps exceed 100 trees per acre. Mountain hemlock seedlings less than 10 trees per acre. Topography often flat to undulating convex/concave microrelief on bottom to mid-third slope positions.

Lodgepole/grouse huckleberry
Community type
CLS4-12 p. 51

- 2b. Lodgepole pine absent or with less than either 20% canopy cover or 100 trees per acre over 6 inches diameter in tree overstory. Lodgepole pine may exceed this stocking level in the understory of seral stands but mountain hemlock seedlings exceed 10 trees per acre. Topography usually convex to flat microrelief on mid to upper third or ridge slope positions.

Mountain hemlock/grouse
huckleberry
Association
CMS1-11 p. 80

- 1b. Grouse huckleberry absent. Xeric sites generally above 5400 feet elevation and south of Willamette Pass. Greenleaf and pinemat manzanita dominate the shrub layer.

Mixed conifer/manzanita
Association
CRS1-11 p. 72

PLANT ASSOCIATION KEY FOR SHASTA RED FIR SERIES

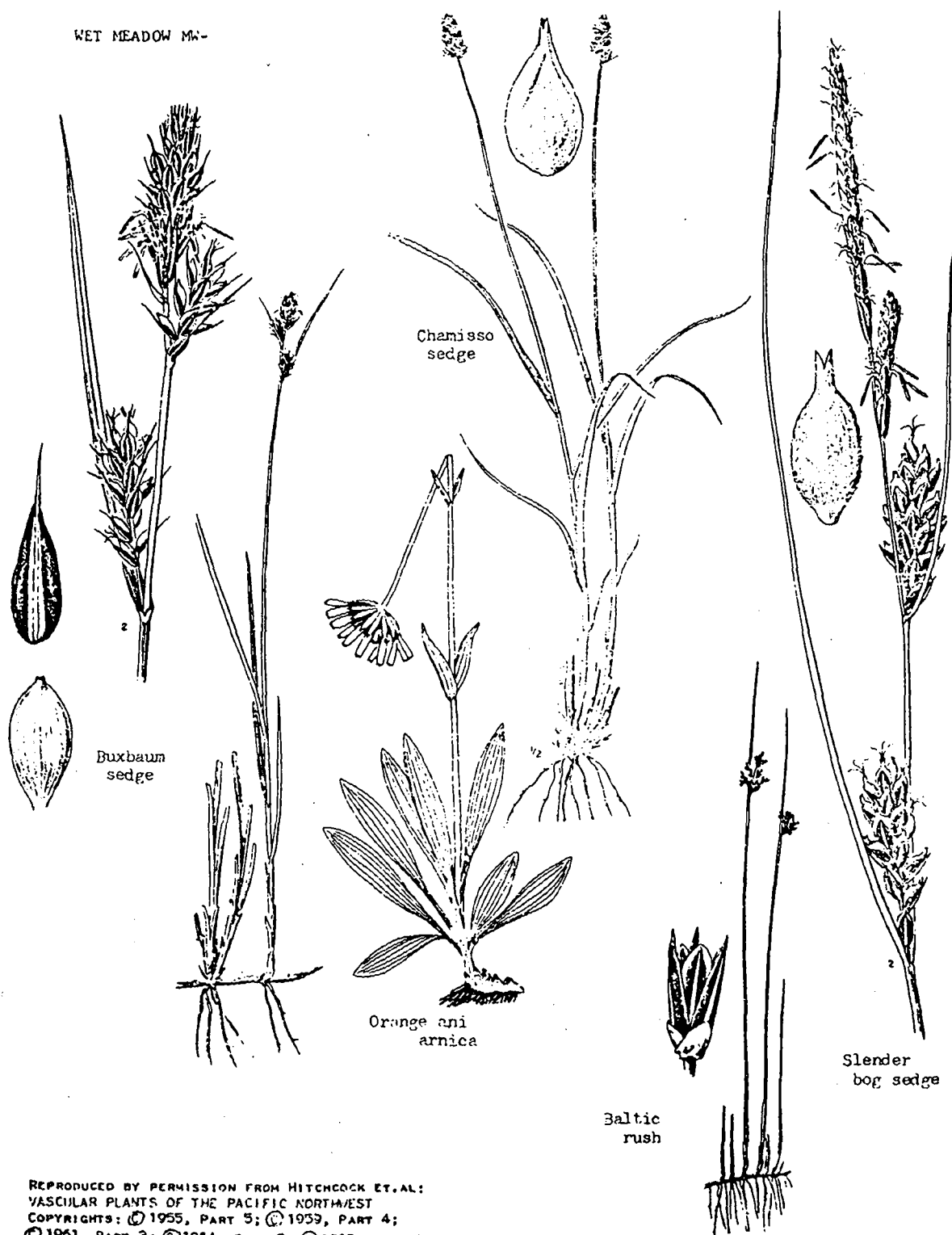
- 1a. Pinemat and/or greenleaf manzanita dominate shrub layer with snowbrush absent or very subordinate. Xeric sites with convex slopes generally above 5400 feet elevation.

Mixed conifer/manzanita
Association
CRS1-11 p. 72

- 1b. Pinemat and/or greenleaf manzanita absent or definitely subordinate to snowbrush and/or bitterbrush. Sites generally below 5400 feet elevation. Refer to white fir or ponderosa pine series key.

p. 14 or 11

WET MEADOW MA-



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WET MEADOW MW

ENVIRONMENT

Location: Deschutes, Fremont NF
Slope position: bottom
Aspect: all exposures
Slope: 0-1%
Elevation: 4200-6100'
Topography: flat to concave
microrelief of basins, drainages
and flats.

SOILS

Geology: alluvium from air-laid pumice, peat
Surface texture: sandy loam to silty loam
Al+AC depth: 20-45"
Buried soil depth: absent-40"
Total soil depth: unknown
Remarks: water table at or within 30" of soil surface
throughout growing season. Soil displacement
when grazed during growing season.

VEGETATION

Dominants	% Cover	Status
Slender bog sedge	0-55	Climax, decreaser
Chamisso sedge	0-24	Climax, decreaser
Buxbaum sedge	0-40	Climax
Nebraska sedge	0-5	Decreaser
Tufted hairgrass	0-12	Decreaser
Baltic rush	5-70	Increaser
Northern reedgrass	0-15	Increaser
Orange arnica	T-25	Increaser
Watson willowweed	0-1	Increaser

Good condition: Dominance by one or more mesic sedges and rushes. Occasionally strong colonies of reedgrass present. Hairgrass always subordinate or absent from wettest sites (0-4% cover). Arnica and willowweed present. Soil surface usually moist if not wet. Litter layer thick. Soil surface layer may feel peaty. Other plants of importance on some sites are Nevada rush, straightleaf rush, analogue sedge, bedstraw, plantain-leaf buttercup, and silverweed.

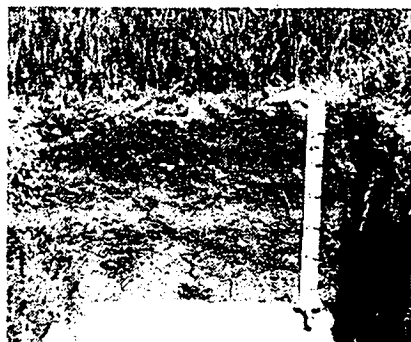
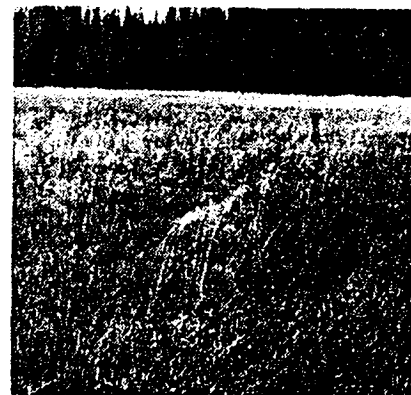
Poor condition: Strong increase in orange arnica, Baltic rush. Willows highlined and decadent when present. Displacement of soil surface from trampling. This condition rarely observed since livestock must be forced into grazing this community.

Revegetation: Generally not recommended unless have control of grazing use and can operate machinery when water tables have receded. Conversion of sedge-rush dominance to domestic species as reed canarygrass, Alta fescue, timothy, or meadow foxtail will improve grazing capacity.

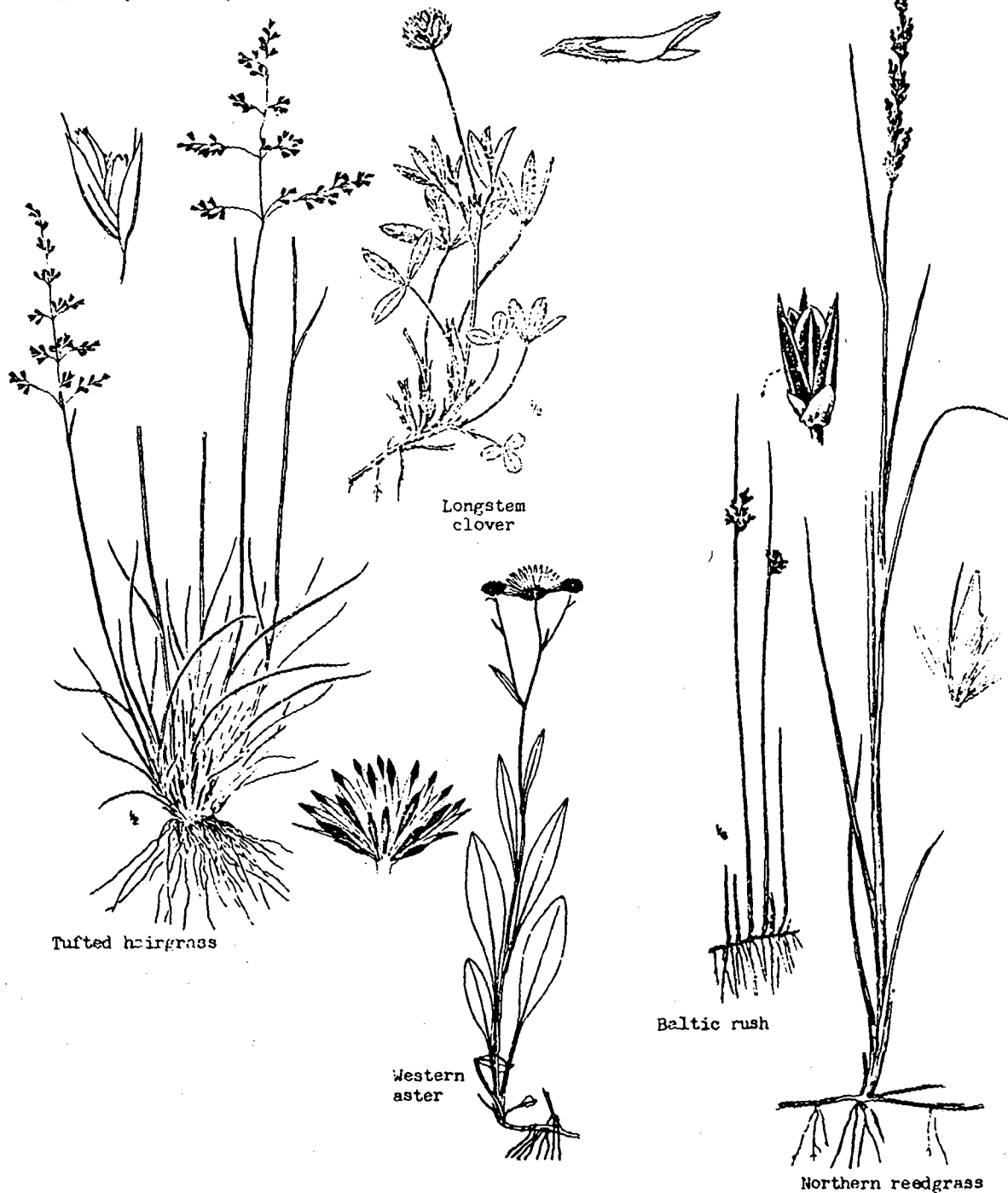
CHARACTERISTICS (5 plots in good condition)

	Forage	BG+P	Moss	Total Hits
Mean	2456	<1%	9%	32.8
Std Error	439		4.0	6.1
5% CI	1218	*	*	18

* data too variable for confidence interval



MOIST (HAIRGRASS) MEADOW MM-19



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MOIST (HAIRGRASS) MEADOW

MM-19

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
Slope position: bottom
Aspect: all exposures
Slope: 0-2%
Elevation: 4200-6100'
Topography: flat to concave with small depressions; basins, flats, drainages.

SOILS

Geology: alluvium from air-laid pumice
Surface texture: loamy coarse sand to silt loam
Al+AC depth: 18-40"
Rooting depth: 30-40"
Buried soil depth: 7-76"
Total soil depth: unknown
Remarks: water table within 45" of soil surface throughout growing season. Pumice particle size rarely exceeds 20mm diameter. Coarse fragment size up to 80% by volume in C horizon. Krotovinas present in more xeric stands. Soil displacement occurs by grazing during early summer.

VEGETATION

Dominants	% Cover	Status
Tufted hairgrass	10-40	Decreaser
Northern reedgrass	0-25	Increaser
Slender bog sedge	0-11	Decreaser
Nevada sedge	0-16	Decreaser
Chamisso sedge	0-18	Decreaser
Baltic rush	3-40	Increaser
Mat muhly	0-4	Increaser
Western aster	0-20	Increaser
Longstem clover	T-40	Increaser

Good condition: Codominance of hairgrass with sedge and/or reedgrass. Mat muhly and Kentucky bluegrass usually absent or very subordinate. More xeric stands with aster, clover, western yarrow, agoseris common. Baltic rush as colonies in depressional microrelief. Soil surface wet to moist through June. Litter layer thick and not compacted.

Poor condition: Codominance by perennial forbs, Baltic rush, mat muhly, Kentucky bluegrass, pullup muhly, California oatgrass. Loss of hairgrass vigor and composition. Increase in bareground from pocket gopher activity. This range condition usually from loss of water table by channel cutting rather than strictly overgrazing since community only slightly preferred over wet meadows.

Revegetation: Generally not recommended unless have control of grazing use and can operate machinery when water tables recede. Grazing capacity increased more effectively through livestock management and control of channel cutting. Domestic species as meadow foxtail, Alta fescue, timothy, and white clover suggested.

Indicators: Prevalence of mat muhly, slender wheatgrass, prairie junegrass and Kentucky bluegrass suggests either site deterioration from hairgrass dominance or a more xeric site than what is normally optimum for hairgrass. The latter condition is not necessarily induced by livestock use.

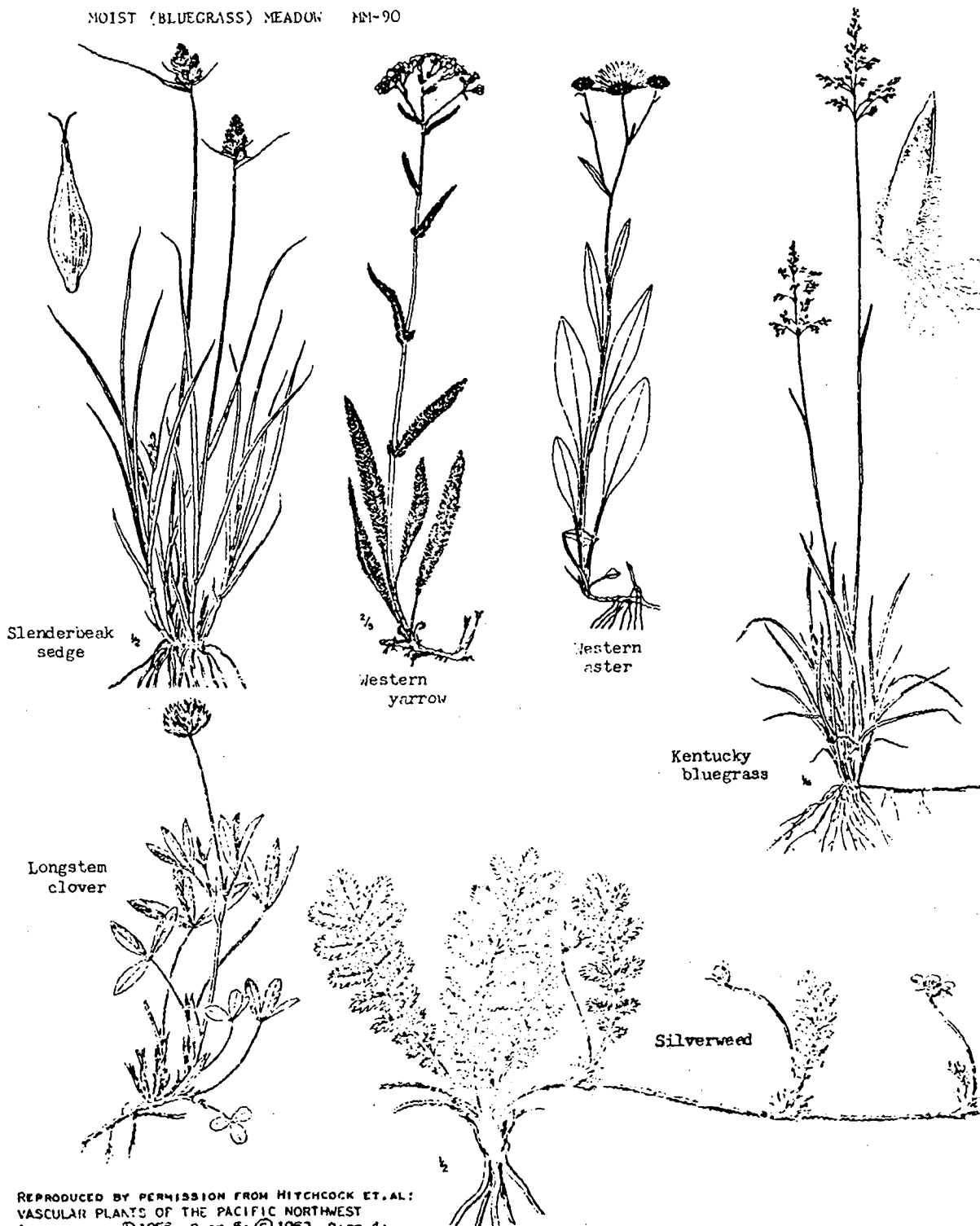
CHARACTERISTICS (7 plots in good condition)

	Forage	BG+P	Moss	Hairgrass Cover	Total Hits
Mean	1947	7%	16%	30	26
Std Error	215	3.3	6.1	6.7	2.5
5% CI	525	*	*	17	6

* Data too variable for confidence interval



MOIST (BLUEGRASS) MEADOW FM-90



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MOIST (BLUEGRASS) MEADOW

MM-90

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
 Slope position: bottom
 Aspect: all exposures
 Slope: 0-2.5%
 Elevation: 4200-6100'
 Topography: flat to slight convex
 microrelief; basins, drainages, lake
 terraces, flats.

SOILS

Geology: alluvium from air-laid pumice
 Surface texture: coarse sandy loam to silty loam
 A1+AC depth: 18-42"
 Rooting depth: 26-50"
 Buried soil depth: 25-54"
 Total soil depth: unknown
 Remarks: water table within 45" of soil surface
 through mid-July. Pumice particle size usually
 < 35mm diameter. Soil compaction by trampling
 is a problem until mid-July.

VEGETATION

Dominants	% Cover	Status
Kentucky bluegrass	5-80	Increaser/decreaser
Slenderbeak sedge	T-30	Increaser/decreaser
Baltic rush	I-7	Increaser
Mat muhly	0-7	Increaser
Western yarrow	T-10	Increaser
Western aster	T-12	Increaser
Dandelion	0-10	Increaser
Longstem clover	0-11	Increaser

Good condition: Bluegrass dominant with open colonies of slender wheatgrass, Williams needlegrass and junegrass. Hairgrass widely scattered but subordinate. Baltic rush and mat muhly widely distributed, not as dense colonies. Forbs subordinate to bluegrass. Plants growing through a loosely deposited litter layer. Gophers very localized. Soil surface moist through June, wet only in early spring.

Poor condition: Yarrow, aster, dandelion, flaptop pussytoes, strawberry usually as dense colonies. Mat muhly, California oatgrass, Baltic rush, Nevada rush, analogue sedge, or alkali muhly may be common. Bluegrass subordinate. Openings in a compacted litter layer common.

Revegetation: Attempt livestock control and manipulation of water table to regain composition and vigor of bluegrass. Lost vigor under fair condition is regained after 2 seasons of rest; production can be doubled. Prevent early use every season. Bluegrass provides best protection for the site. Introduction of domestic species not recommended.

Indicators: Loss of bluegrass leaf length, seed stalk vigor plus changes in growth suggest excessive grazing. Large colonies of mat muhly, yarrow, dandelion, clover and Baltic rush suggest low fair to poor condition. Large colonies of silverweed, sandwort, or cudweed suggest poor to very poor condition. Complete protection does not revert to tufted hairgrass dominance without significantly changing water table regime.

CHARACTERISTICS (6 plots in good condition)

	Forage	BC+P	Moss	Hits	Total Bluegrass Hits
Mean	2009	6%	6%	34.3	16.8
Std Error	163	1.08	2.3	2.7	4.3
5% CI	420	2.8	5.9	7	11



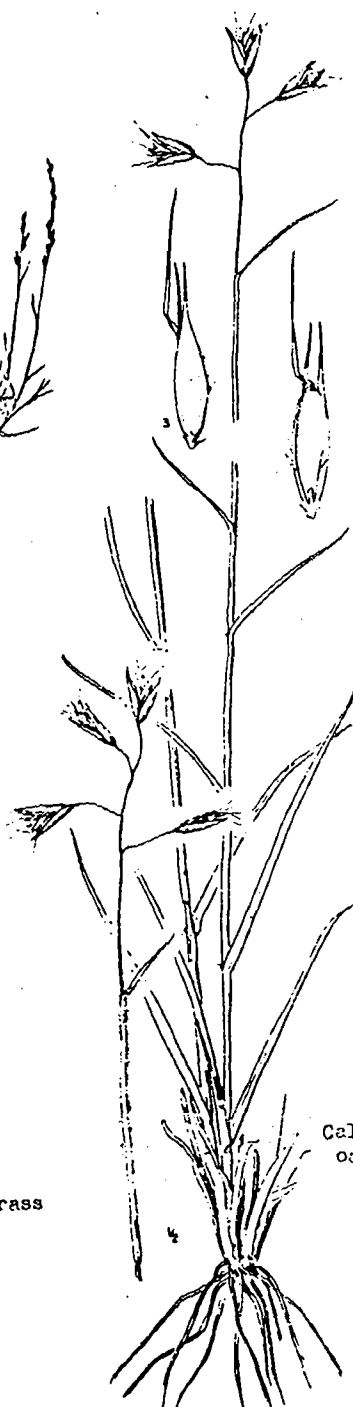
DRY MEADOW MD-19-11



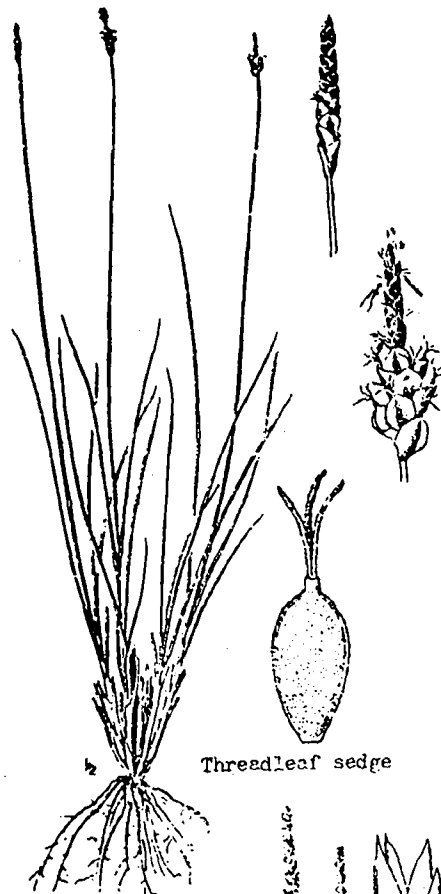
Pullup muhly



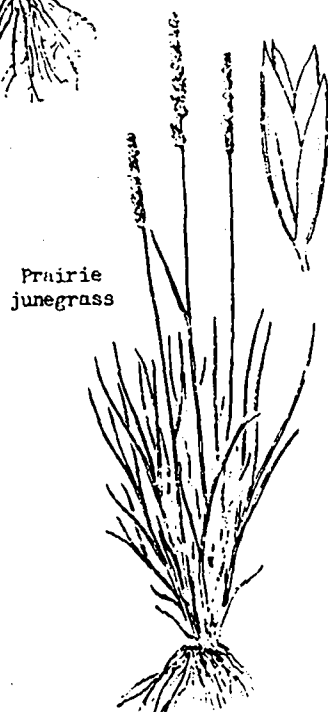
Cusick
bluegrass



California
oatgrass



Threadleaf sedge



Prairie
junegrass

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DRY MEADOW

MD-19-11

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
Slope position: bottom
Aspect: all exposures
Slope: 0-2%
Elevation: 4200-6100'
Topography: flat with small depressions
drainage, basins.

SOILS

Geology: alluvium from air-laid pumice/extrusive
alluvium
Surface texture: coarse sandy loam to silty loam
Al+AC depth: 25-35
Rooting depth: 25-30"
Buried soil depth: 30-65"
Total soil depth: unknown
Remarks: Water table usually exceeds 45" below
surface by July; absent by mid-August. Compaction
and soil displacement a problem during May to mid
June.

VEGETATION

<u>Dominants</u>	<u>% Cover</u>	<u>Status</u>
Cusick bluegrass	13-28	Decreaser
Slender wheatgrass	T-6	Increaser/decreaser
Slenderbeak sedge	0-14	Decreaser
Prairie junegrass	T-15	Decreaser
California oatgrass	0-7	Increaser/decreaser
Treadleaf sedge	0-20	Increaser

Good condition: Cusick bluegrass evenly distributed
across stand with wheatgrass, junegrass and oatgrass
strong subordinates. Perennial forbs as longstem clover,
cinquefoil, yarrow and aster subordinate and not aggregat-
ed as colonies. Interspaces between bluegrass plants
dominated by litter. Grass clumps rarely pedestalled.

Poor condition: Bareground and erosion pavement exceeds
15% cover. Bluegrass clumps pedestalled and distribution
aggregated. Prominence of pullup muhly, mat muhly,
yarrow, pussytoes, cinquefoil, analogue sedge, aster and
dandelion as large colonies. Annual forbs common.
Litter layer compacted and broken in distribution. Fair
condition wheatgrass, oatgrass, and junegrass.

Revegetation: Community is the most sensitive of the
meadow sites to grazing use and responds the slowest to
livestock management. Renovation with domestic species
may be necessary in poor condition; suggest using slender
wheatgrass, chewings fescue, hard fescue or Sherman big
bluegrass.

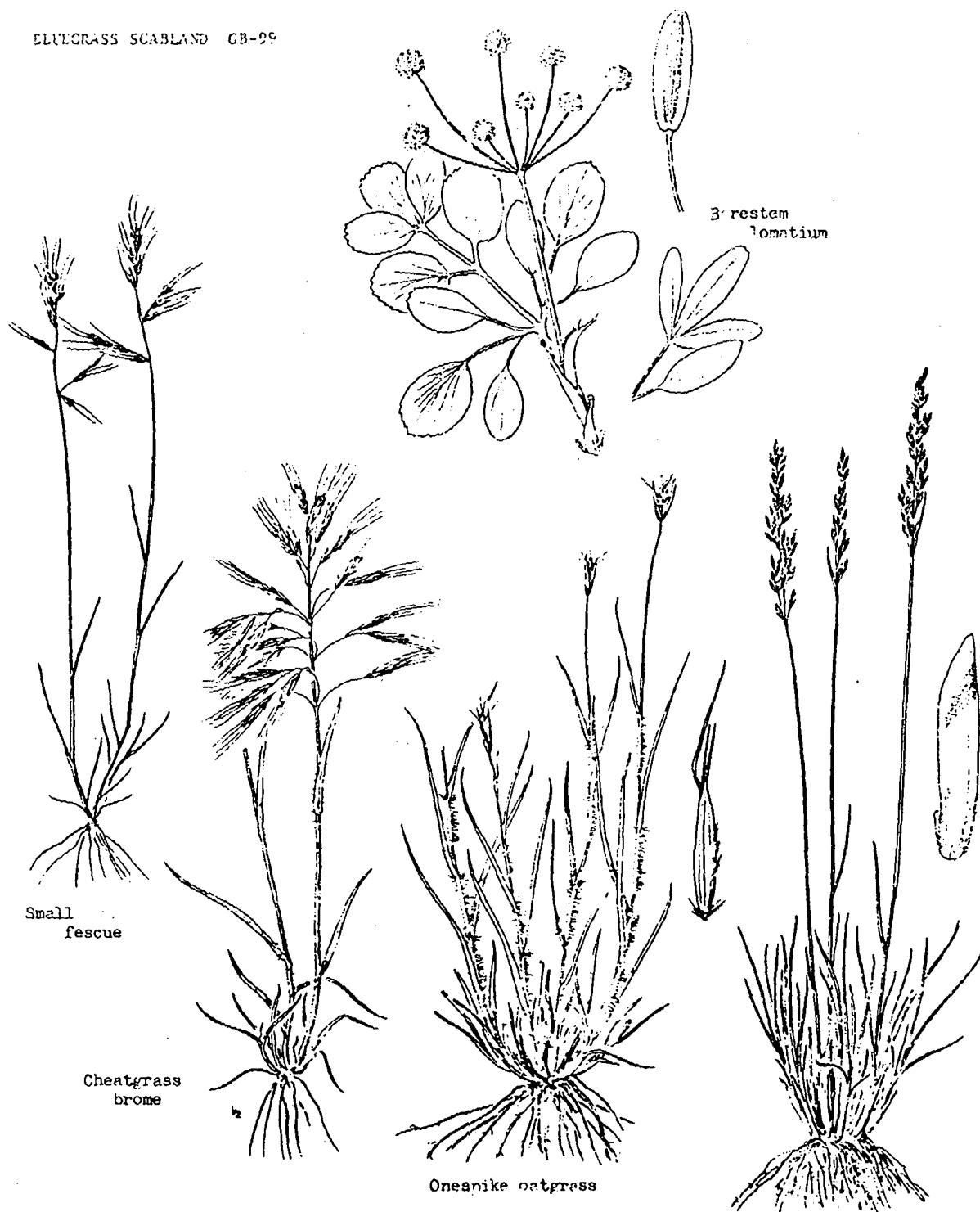
Indicators: Community differentiated from scablands by
having relatively deep soils and lack of surface rock.
Bluejoint reedgrass, Baltic rush, junegrass, agoseris,
dandelion in bare openings suggest an uptrend from a poor
condition.



CHARACTERISTICS (4 plots in fair condition)

	Forage	BG+P	Moss	Bluegrass Cover	Total Hits
Mean	1333	2%	9%	26%	35
Std Error	425	1.3	1.98	4.7	4.6
5% CI	1180	*	6.3	15	15

* Data too variable for confidence interval



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Sandberg bluegrass

BLUEGRASS SCABLAND

GB-99

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
Slope position: lower or upper third
Aspect: all exposures
Slope: flat-10%
Elevation: 2600-5600'
Topography: flat to convex microrelief of ridgelines, benches, head of escarpments.

SOILS

Geology: basalt colluvium, residuum, welded tuff
Surface texture: fine sandy loam to silt loam
Alt+AC depth: absent-25"
Rooting depth: 12-18"
Buried soil depth: absent-12"
Total soil depth: 14-25"
Remarks: pumice usually eroded away. Solum very shallow and stoney; saturated with water during spring and early summer.

VEGETATION

Dominants	% Cover	Status
Sandberg bluegrass	2-20	Climax, decreaser
Onespike oatgrass	0-10	Decreasers
Small fescue	0-60	Increaser
Barestem lomatium	T-20	Increaser

Good condition: Interspaces between exposed surface rock dominated by Nevada and/or Sandberg bluegrass and oatgrass. Bareground + desert pavement less than 15% cover. Annual grasses and forbs very subordinate. Perennial forbs as pussytoes, subordinate to grasses.

Poor condition: Codominance by small fescue, annual hair-grass, hairy brome. Perennial grasses within protection of surface rocks. Interspaces dominated by annual forbs. Strong pedestalling of bunchgrasses. Bareground exceeds 20%. Lomatiums may dominate in biomass production.

Revegetation: Should not be attempted.

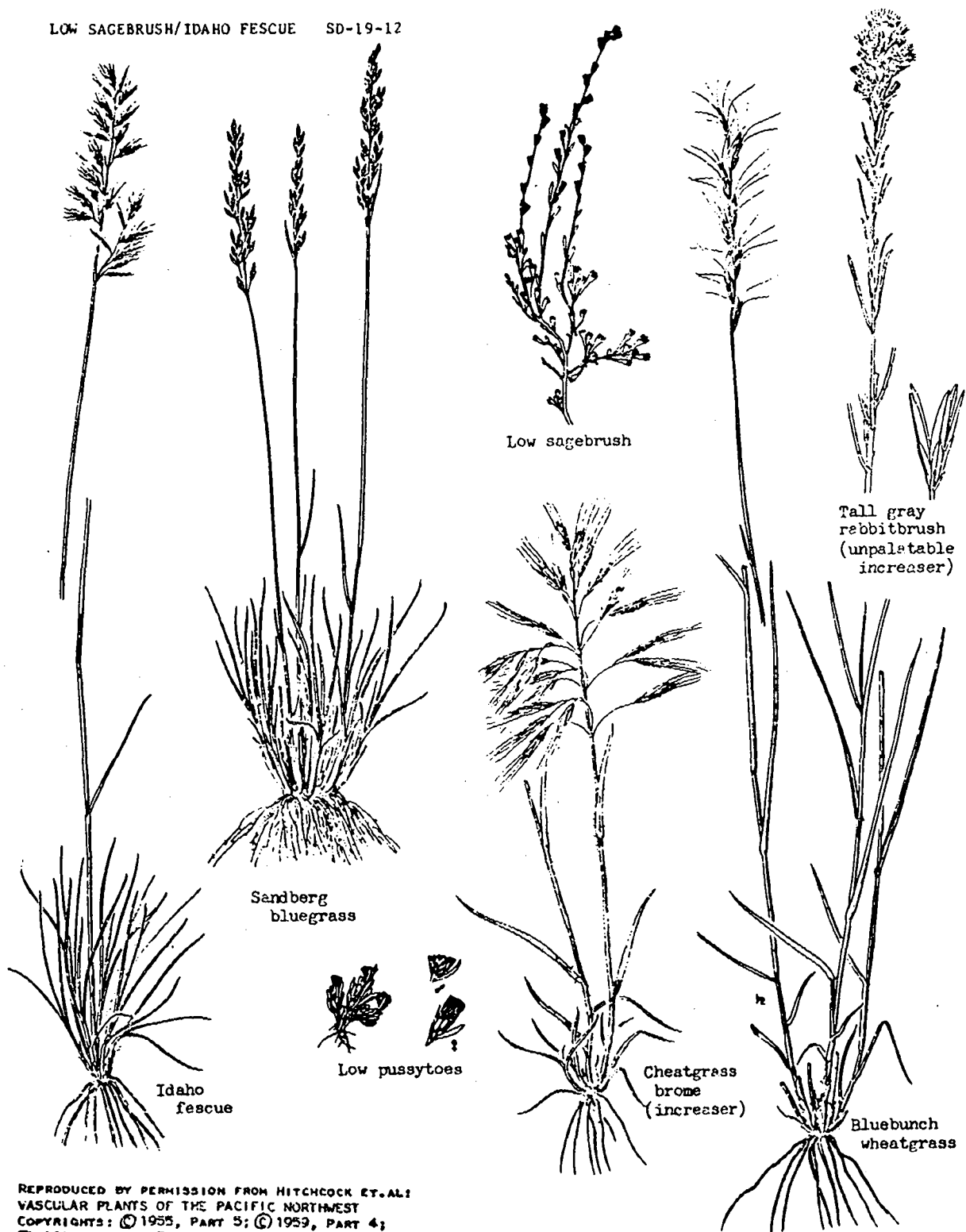
Indicators: Scattered juniper, ponderosa pine, big sagebrush or bitterbrush suggest deeper soils or cracked bedrock and possible loss of site potential through grazing or recent erosion rather than long term "geologic" erosion suggestive of scablands. Soils containing volcanic ash may support cheatgrass after disturbance. Scablands preferred by deer in early spring. Do not restrict surface water drainage by constructing roads across scablands.



CHARACTERISTICS (4 plots in fair and poor condition)

	Forage	Rock	BG+P	Moss
Mean	70	20	22%	11%
Std Error	5.9	9.1	7.6	1.8
5% CI	28	*	*	5

* Data too variable to give meaningful confidence interval.



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LOW SAGEBRUSH/IDAHO FESCUE

SD-19-12

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
Slope position: upper third to top
Aspect: all exposures
Slope: 2-5%
Elevation: 4700-5200'
Topography: convex to flat undulating
to rolling slopes of plateaus, ridge-
lines, flats.

SOILS

Geology: air-laid pumice/basalt or andesite
Surface texture: loamy coarse sand to fine sandy loam
Al+AC depth: 7-20"
Rooting depth: 10-20"
Buried soil depth: 7-28"
Total soil depth: 18-28"
Remarks: pumice is well mixed but lying discontinuous
over buried soil. Cobble content comprises up to
80% of buried soil. Vesicular soil surface present.
Saturated in spring months.

VEGETATION

Dominants	% Cover	Status
Low sagebrush	5-15	Increaser, climax
Bluebunch wheatgrass	0-3	Decreaser
Idaho fescue	2-16	Decreaser
Sandberg bluegrass	1-3	Increaser
Squirreltail	T-10	Increaser
Low pussytoes	T-7	Increaser

Good condition: Decreaser plants dominant. Rich assort-
ment of forbs without any species being prevalent. Soil
surface covered with litter, moss or rock. All ages of
shrubs represented.

Poor condition: Excessive mortality of low sagebrush.
Cheatgrass, squirreltail, pussytoes, bluegrass common.
Decreasers restricted to protection of shrub crowns.
Annuals common. Pavement and bareground exceed 60% of
ground. Rabbitbrush prevalent.

Revegetation: Soils too stoney and shallow for success-
ful introduction of domestic species. Low sagebrush and
bitterbrush preferred by deer during winter and early
spring; retain these shrubs where appropriate.

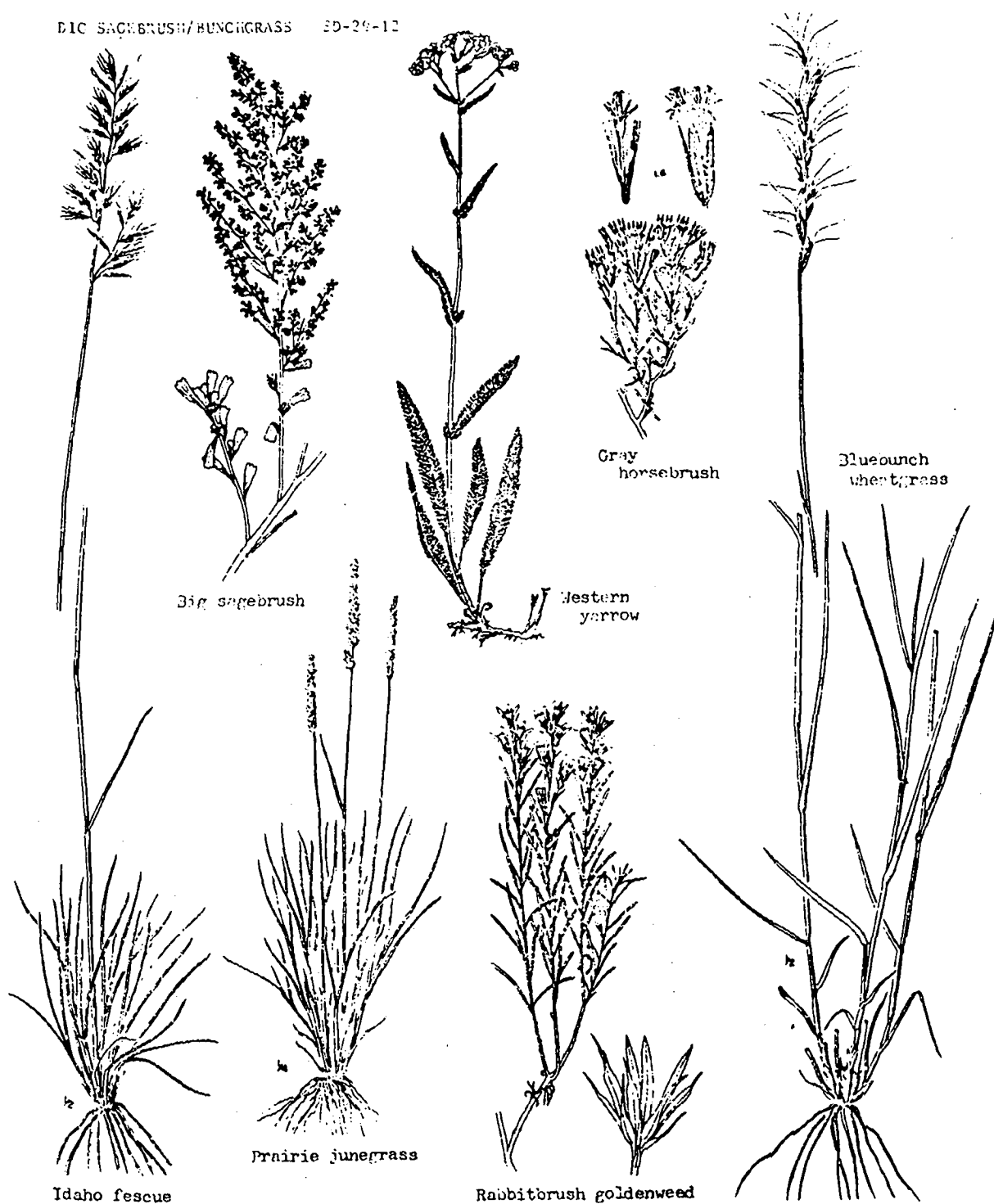
Indicators: Mesic-tending stands have California oatgrass
and prairie junegrass. Increasing elevation gives a
decline in amount of bluebunch wheatgrass and increase in
bitterbrush.



CHARACTERISTICS (5 plots in fair condition)

	Surface				% Cover	
	Herbage	Rock	BG+P	Moss	Fescue	Sage
Mean	179	11%	42%	5%	10	10
Std Error	61.9	3.1	4.7	1.6	2.4	1.3
5% CI	*	9	13	*	6.6	3.6

* Data too variable for confidence interval



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BIG SAGEBRUSH/BUNCHGRASS

SD29-12

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
 Slope position: lower to upper third
 Aspect: all exposures
 Slope: 2-45%
 Elevation: 4800-7100 ft.
 Topography: convex microrelief;
 sideslopes, escarpments, flats,
 plateaus.

SOILS

Geology: reworked pumice over basalt, andesite
 colluvium
 Surface texture: coarse sandy loam to silt loam
 Al+AC depth: 10-25"
 Rooting depth: 8-44"
 Total depth: 20-55"
 Stone content: 0-20%
 Soil classification:
 Remarks: surface rock and pavement prevalent where
 colluvial soils occur.

VEGETATION

Dominants	% Cover	Constancy	Status
Big sagebrush	5-20	100	Increaser, climax shrub
Bluebunch wheatgrass	0-10	60	Decreaser
Idaho fescue	0-20	90	Decreaser
Prairie junegrass	0-5	40	Increaser
Sandberg bluegrass	0-5	90	Increaser
Western yarrow	0-5	75	Increaser
Squirreltail	T-2	60	Increaser
Western juniper	0-4 trees/A	25	Increaser

Good Condition: Relatively open stand of big sagebrush with Idaho fescue on north to east aspects; bluebunch wheatgrass dominates southerly aspects. Wyeth buckwheat, Sandberg bluegrass, junegrass, western yarrow, tailcup lupine are occasional. Green and gray rabbitbrush scarce and well dispersed. Forbs scarce between bunchgrass. Very few bitterbrush. Mountain big sagebrush found above 6000' and basin big sagebrush below 6000'.

Poor Condition: Prevalence of rabbitbrush, goldenweed, cheatgrass, annual forbs, and squirreltail. Pedestalling of bunchgrass. Sagebrush prominent. Decreasers restricted to shrub protection. Western juniper will increase in cover with continued overuse of palatable forage and absence of fire.

Revegetation: Slopes usually too steep for seed drilling equipment. Domestic grass seeding requires brush control to prepare site and slow reinvasion. Retain a portion of shrub component as deer winter forage. Suggested domestic species are crested, intermediate or pubescent wheatgrass and/or Russian wildrye. Expect increase of rabbitbrush, grey horsebrush, goldenweed, squirreltail and cheatgrass with soil scarification or prescribed burning.

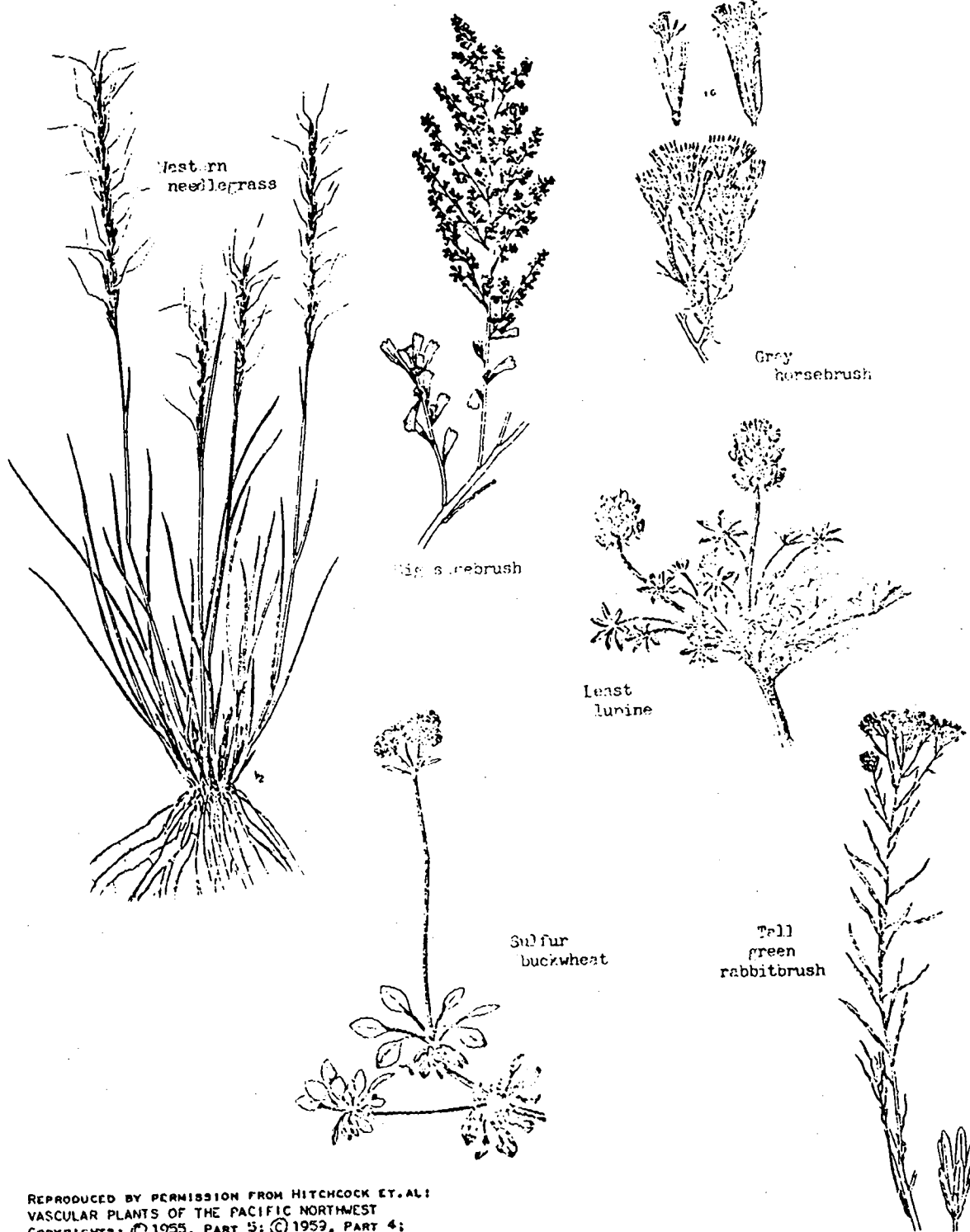
Indicators: Wyeth buckwheat, Sandberg bluegrass and grey horsebrush restricted to slopes. Southern aspects along desert fringe have Thurber needlegrass. Stands have grassland appearance following burn. Sagebrush re-invasion may take 15-25 years in vigorous grass stands. Community restricted to northern half of Fremont NF and along edge of desert on Deschutes and Winema NF. Stands on Deschutes NF tend to be 250 lbs/acre lower in herbage production than those on Fremont or Winema NF. Stands on the Fremont NF have a richer component of Ross sedge, Sandberg bluegrass and western needlegrass and less prairie junegrass than Deschutes NF examples.

CHARACTERISTICS (8 plots in good forage rating)

	Forage	Surface Rock	BG+P	Moss	Sage Cover
Mean	369	12%	37%	3%	13%
Std Error	236.9	13.8	15.9	3.6	5.8
5% CI	164	9	11	2	4

BIG SAGEBRUSH/BUNCHGRASS

SD29-12



BIG SAGEBRUSH/NEEDLEGRASS (RHYOLITE)

SD-29-14

ENVIRONMENT

Location: Ft. Rock RD, Deschutes NF
Slope position: lower to bottom
Aspect: all exposures
Slope: 0 - 7%
Elevation: 4800 - 4900'
Topography: concave to convex microrelief of basins and flats.

SOILS

Geology: Newberry rhyolite pumice/Mazama pumice/alluvium
Surface texture: coarse sand to loamy sand
Al-AC depth: 5 - 7"
Rooting depth: 17 - 27"
Buried soil depth: 11 - 28"
Total soil depth: 65" +
Remarks: well-drained profile with Newberry C horizon pumice 45mm particle size and 90% coarse fragments by volume.

VEGETATION

<u>Dominants</u>	<u>% Cover</u>	<u>Status</u>
Big sagebrush	10-20	Increaser
Sulfur eriogonum	< 5	Decreaser
Horsebrush	< 3	Increaser
Needlegrass	1-7	Increaser

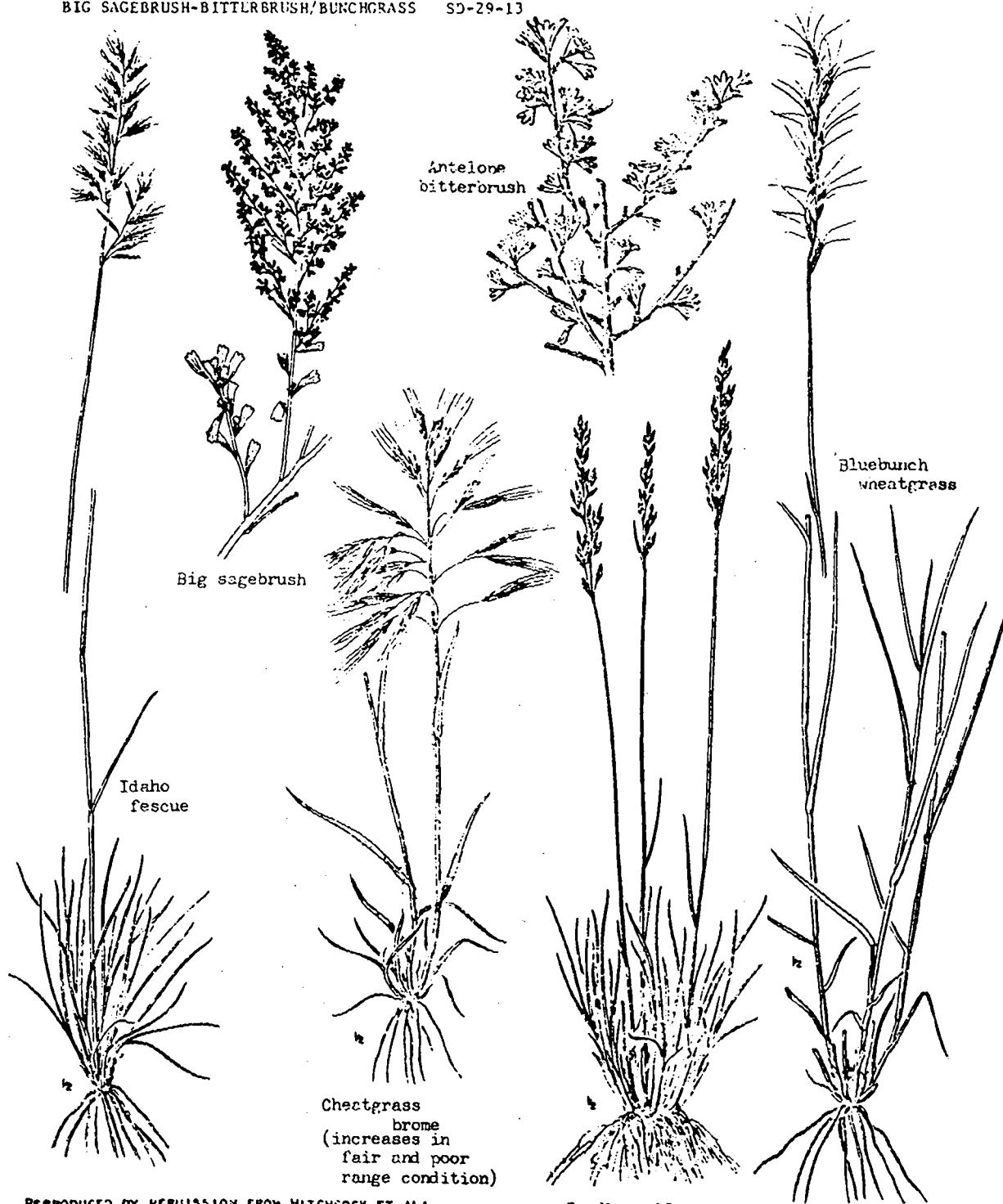
Good condition: Sagebrush is the stand dominant. Sulfur eriogonum, granitigila present but subordinate. Horsebrush and rabbitbrush very occasional. Needlegrass, Ross sedge and squirreltail in shrub interspaces. Common forbs are least lupine, yarrow, eriophyllum, rockcress, pussytoes and cushion buckwheat. Herbage production approximates 150 lb/acre. Bareground and pavement range from 60-85%

Poor condition: Poor forb complement. Green rabbitbrush common. Increase in horsebrush. Eriogonum is near absent. Squirreltail dominates over Ross sedge or needlegrass and somewhat aggregated to shrub influence.

Revegetation: Herbicide treatment of sagebrush and rabbitbrush is necessary. Native grasses should be replaced with introduced species as crested wheatgrass. Expect rapid invasion by rabbitbrush. Widespread treatment within this community is not recommended.

Indicators: This community is characterized by treeless basins having sagebrush, needlegrass and squirreltail. This is a non-timbered site although scattered lodgepole may occur.





BIG SAGEBRUSH-BITTERBRUSH/BUNCHGRASS

SD-29-13

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
 Slope position: mid to upper third
 Aspect: all exposures
 Slope: 15-50%
 Elevation: 4600-5900'
 Topography: concave, flat, convex,
 butte and mountain sideslopes.

SOILS

Geology: basalt, andesite colluvium or pumice/weld
 tuff, cinders
 Surface texture: loamy sand to fine sandy loam
 Al+AC depth: 12-22"
 Rooting depth: 22-47"
 Buried soil depth: 12-30"
 Total soil depth: 22-55"
 Remarks: colluvial soils with high gravel and cobble
 content. Pumice particle size less than 10mm.
 Coarse pumice content less than 15% by horizon
 volume.

VEGETATION

Dominants	% Cover	Status
Big sagebrush	6-22	Climax, increaser
Bitterbrush	2-10	Climax, decreaser
Bluebunch wheatgrass	1-10	Decreater, southerly
Idaho fescue	0-20	Decreater, northerly
Sandberg bluegrass	0-3	Increaser
Wyeth buckwheat	0-7	Decreater, preferred by deer

Good condition: Bitterbrush codominates or slightly subordinate to sagebrush. Dominant perennial grasses evenly distributed across shrub interspaces. Wyeth buckwheat, bluegrass, and junegrass common. Forbs as phacelia, tailcup lupine, threadleaf fleabane obvious.
Poor condition: Age class distributions and cover of bitterbrush and serviceberry suggest shrubs not maintaining themselves. Sagebrush strongly dominant. Buckwheat not apparent. Wheatgrass and fescue distribution restricted to shrub understory. Pedestalling of bunchgrasses. Cheatgrass and ephemeral forbs dominate interspaces

Revegetation: Much of this community inoperable for machinery. Herbicides or burning necessary to reduce sagebrush. Provide an adequate supply of bitterbrush for winter deer and antelope browse mixed with some sagebrush for variety. Cheatgrass and rabbitbrushes will increase considerably with soil displacement or overgrazing.

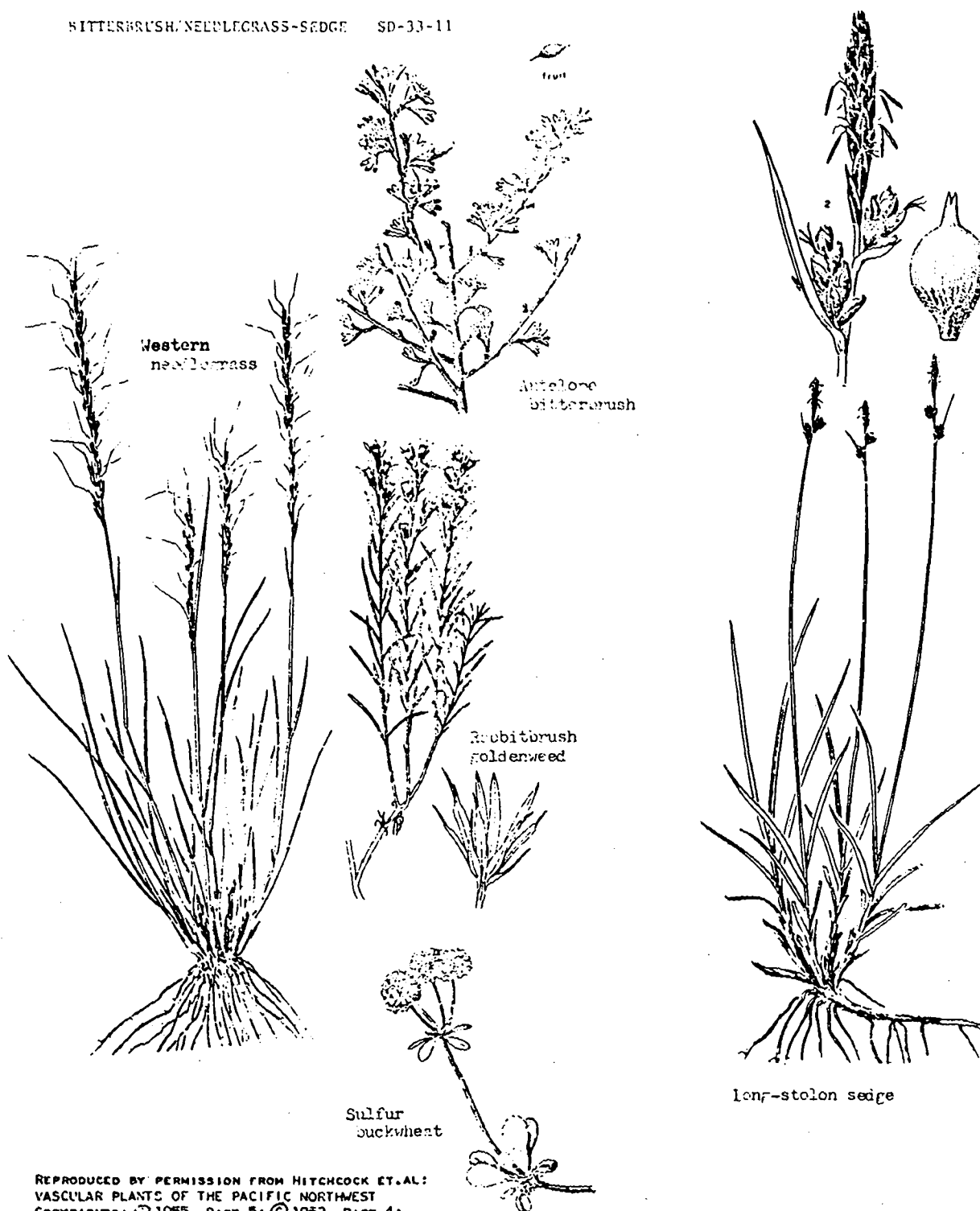
Indicators: Southerly aspects dominated by wheatgrass; fescue dominates east and northerly exposure, and with increase in elevation. Protection from grazing or burning induces western juniper invasion. Stands burned within last 40 years dominated by bitterbrush and/or buckwheat and perennial grass. Sagebrush absent or as immature plants. Herbage doubles over unburned.

CHARACTERISTICS (5 plots in good condition)

	Surface				% Cover			
	Forage	Rock	BG+P	Moss	Sage	Bitter Brush	Wheat Grass	Fescue
Mean	200	9%	32%	3.2%	16	7	4.5	6.0
Std Error	33.5	3.7	6.0	1.4	2.8	1.6	1.3	1.3
5% CI	93	10	17	*	8	4	3.6	3.6

* data too variable for confidence interval





BITTERBRUSH/NEEDLEGRASS-SEDGE

SD-33-11

ENVIRONMENT

Location: Winema NF
 Slope position: lower to bottom
 Aspect: all exposures
 Slope: 0-10%
 Elevation: 4400 - 5400'
 Topography: undulating convex to
 concave, stream terraces, floodplains,
 dry drainages.

SOILS

Geology: pumice and basic scoria alluvium
 Surface texture: coarse sandy loam to loamy sand
 Al+AC depth: 18 - 27"
 Rooting depth: 30 - 55"
 Buried soil depth: 22 - 110"
 Total soil depth: 55" +
 Remarks: soils derived from fairly deep alluvial
 deposits. Gravel content less than 30%. Pumice
 coarse fragments rarely exceed 10% by volume.

VEGETATION

Dominants	% Cover	Status
Bitterbrush	5-20	Decreaser
Goldenweed	T-8	Increaser
Sulfur eriogonum	T-5	Decreaser
Western needlegrass	4-12	Increaser
Long-stolon sedge	3-35	Increaser

Good condition: Bitterbrush well distributed over site. Goldenweed decidedly subordinate. Very occasional rabbitbrush. Eriogonum common. Long-stolon sedge evenly distributed or as openly grown groups; codominate with needlegrass. California brome, woolly senecio, hoary aster, pussypaws and phacelia common. Soil surface friable. Pedestalling not pronounced.

Poor condition: Stand dominated by goldenweed and gray rabbitbrush. Bitterbrush as older, heavily grazed plants. Sedge as dense colonies. Eriogonum rare or within shrub canopy. Many of forbs found only within shrubs. Soil surface compacted. Annual forbs dominate interspaces.

Revegetation: Should not be attempted because of deep, sandy soils. Manage for re-establishment of bitterbrush.

Indicators: This is non-timbered shrub site; occasionally ponderosa or lodgepole pine present as scattered individuals. Pussypaws and hoary aster suggest xeric site. Herbaceous production greater in fair to poor condition than good condition.

CHARACTERISTICS (5 plots in good condition)

	Forage	Surface Rock	BG+P	% Cover		
				Bitter- brush	Needle- grass	Sedge
Mean	112	1%	63%	16	8	13
Std Error	30.0	.26	3.6	1.4	1.4	5.6
5% CI	83	.72	10	7	4	*

* Data too variable for confidence interval



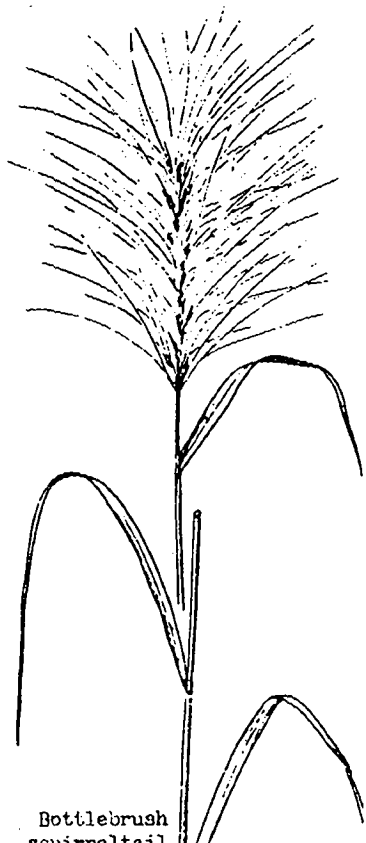
Granitegilia



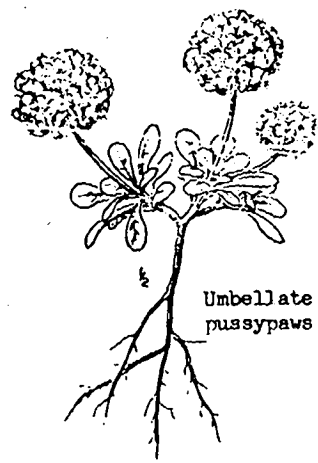
Gray horsebrush



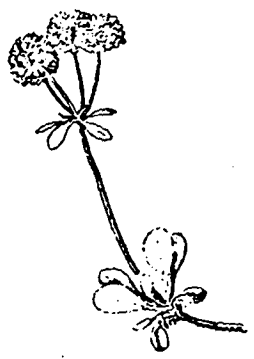
Thurber
needlegrass



Bottlebrush
squirreltail



Umbellate
pussypaws



Sulfur buckwheat



BUCKWHEAT FLATS (RHYOLITE PUMICE)

SD-93-23

ENVIRONMENT

Location: Ft. Rock RD, Deschutes NF
Slope position: bottom
Aspect: all exposures
Slope: 0-2%
Elevation: 4800-4900'
Topography: gently undulating convex
and concave slopes of basins

SOILS

Geology: Newberry rhyolite and pumice Mazama pumice/
alluvium
Surface texture: coarse sand
AC depth: 7"
Rooting depth: 12-20"
Buried soil depth: 20-25"
Total soil depth: 40"+
Remarks: A₁ horizon appears missing. Wind erosion
and frost heaving common. Pocket gophers common.
Bareground, pavement and pumice gravels cover over
90% of surface.

VEGETATION

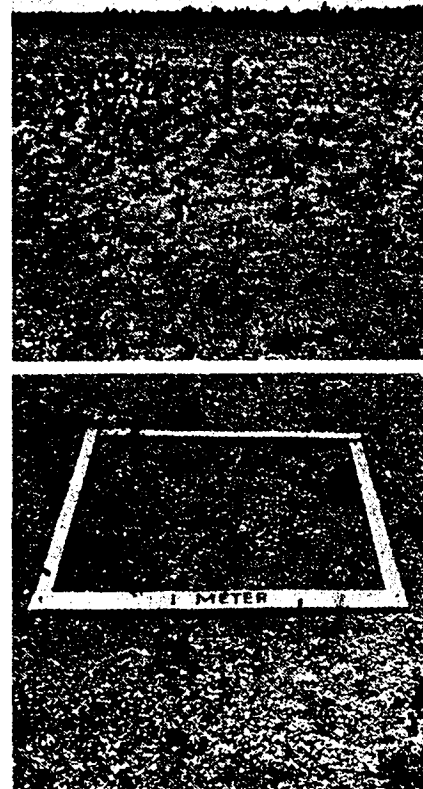
<u>Dominants</u>	<u>% Cover</u>	<u>Status</u>
Sulfur eriogonum	5	Decreaser
Squirreltail	3-5	Increaser
Needlegrass (Thurber and Western)	5	Increaser

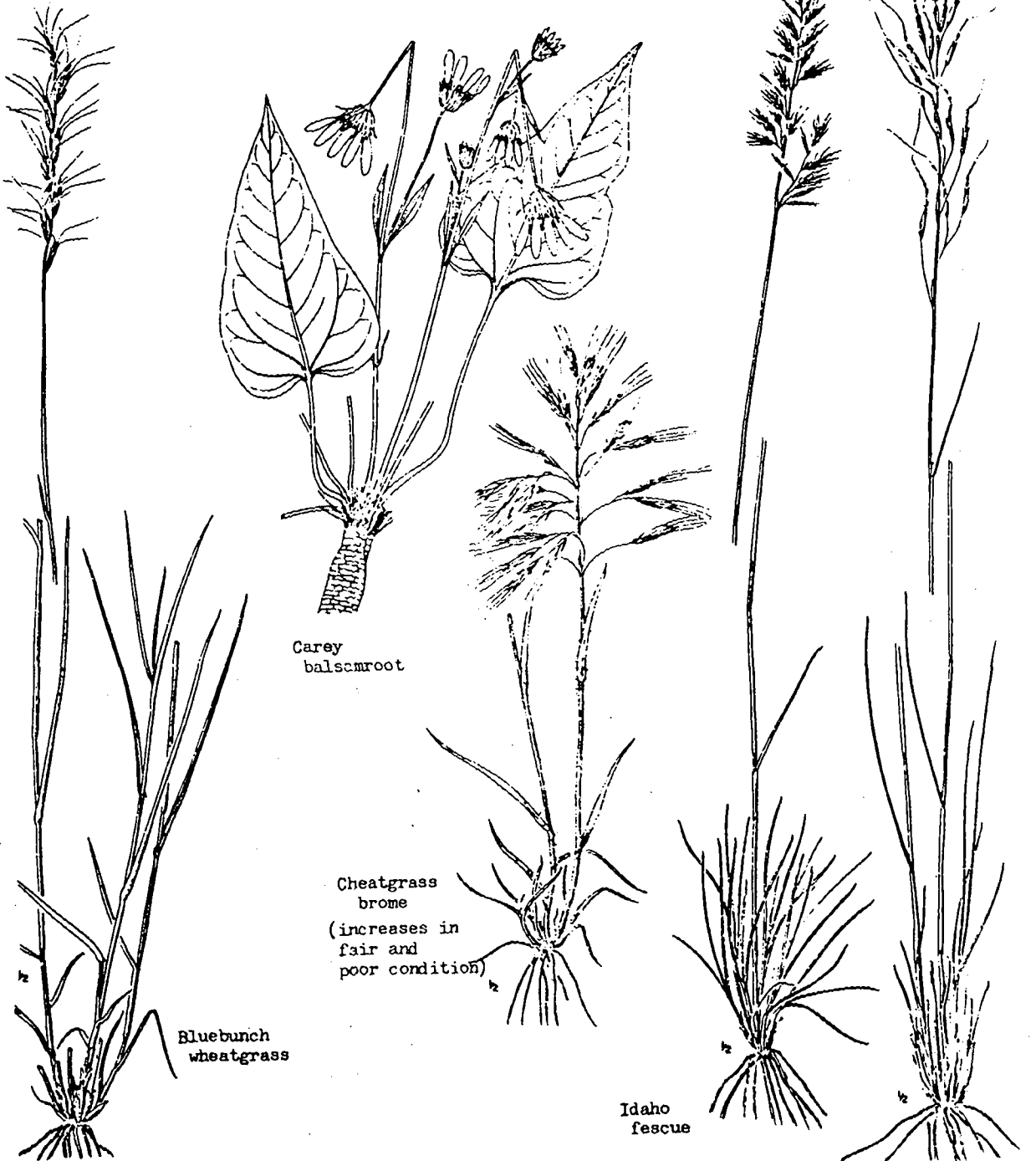
Ground vegetation: Stand very depauperate of vegetation
being represented by low shrubs and herbaceous vegetation.
Sulfur eriogonum, horsebrush, granitegila represent shrubs.
Forbs are yarrow, eriophyllum, pussypaws, cushion eriogonum,
woolly grousel and phacelia.

Revegetation: Should not be attempted because of severe
microclimate and coarse pumice soils.

Range management: Early spring use by mule deer. Forage
production so low that stands usually unsuitable for
livestock.

Indicators: Better condition site have eriogonum and a
rich forb complement. Poorer condition dominated by
horsebrush and granitegila.





Carey
balsamroot

Cheatgrass
brome
(increases in
fair and
poor condition)

Bluebunch
wheatgrass

Idaho
fescue

Thurber needlegrass

JUNIPER/BITTERBRUSH/BUNCHGRASS

CJ-53-11

ENVIRONMENT

Location: Deschutes, Fremont NF
 Slope position: upper third to top
 Aspect: all exposures (southerly)
 Slope: 1-30%
 Elevation: 3000-4300'
 Topography: flat to convex moundswale
 microrelief; elevated plateaus,
 ridgelines and escarpment slopes.

SOILS

Geology: basalt or andesite colluvium, pumice/basalt
 Surface texture: coarse sandy loam to loam
 Al+AC depth: 9-15"
 Rooting depth: 12-15"
 Buried soil depth: 0-9"
 Total soil depth: 12-20"
 Remarks: pumice highly mixed when present, usually
 pumice has been eroded away. Soils very stoney,
 shallow and xeric.

VEGETATION

Dominants	% Cover	Status
Western juniper	3-30	Increaser
Bitterbrush	6-15	Decreaser
Idaho fescue	T-25	Decreaser
Bluebunch wheatgrass	T-10	Decreaser
Thurber needlegrass	0-12	Increaser

Good condition: Bitterbrush represented by all age classes, light to moderately hedged. Sulfur or northern buckwheat present but subordinate. Wheatgrass and fescue well distributed, all age classes present. Sandberg bluegrass occasional. Balsamroot and western yarrow generally distributed. Juniper as older age classes, not strongly highlined.

Poor condition: Predominance of rabbitbrushes, squirrel-tail, Sandberg bluegrass, small fescue, cheatgrass, and annual forbs with openings in grass stand. Bitterbrush heavily-hedged and of mature age-class. Balsamroot and eriogonums scarce or absent. Decreasers restricted to shrub and juniper understory.

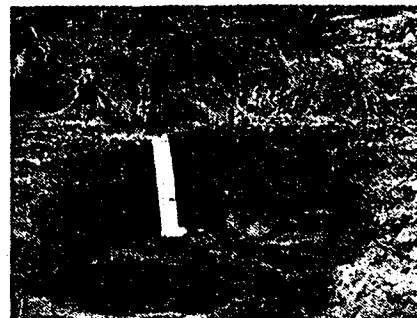
Revegetation: Sites usually too steep and/or stoney for use of machinery. Soils too shallow for successful establishment of domestic grass species. Maintain density and vigor of bitterbrush for big game fall-winter-spring use. Thinning of younger age classes in juniper may be necessary to slow its invasion following rest from overgrazing or periodic burning.

Indicators: Wheatgrass prominent on south exposures. Fescue more prevalent on east and north aspects. Stand may contain an occasional ponderosa or incense cedar where community is dispersed through forest zone. Community also associated with scabflats. Juniper has 10-100 sq.ft. basal area with 60-280 stems/acre.

CHARACTERISTICS (4 plots in good condition)

	Forage	% Cover				
		Surface Rock	BC+P	Bitter brush	Wheat grass	Fescue
Mean	240	19%	39%	6	5	11
Std Error	18.1	5.9	5.2	1.5	1.7	4.7
5% CI	57	18	16	4.7	*	*

* Sample too variable to determine confidence interval.

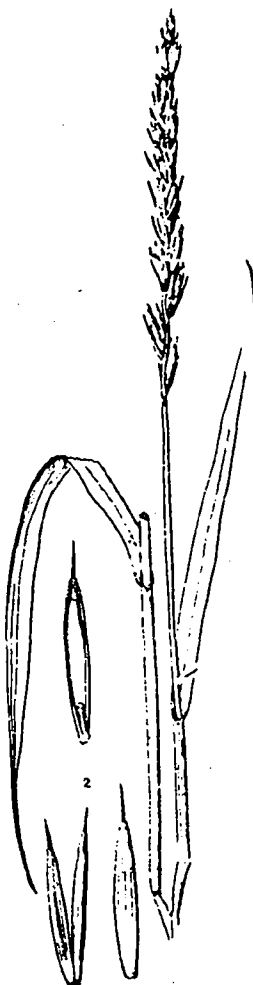




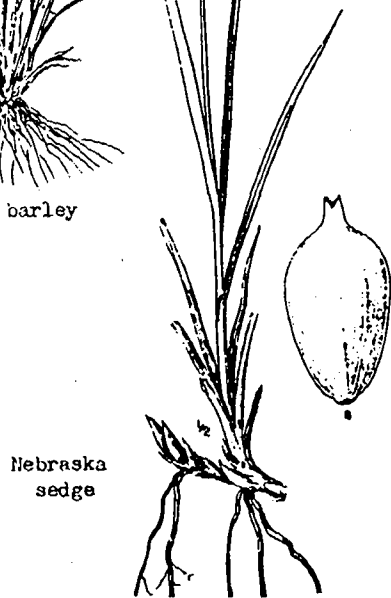
Meadow barley



Orange arnica



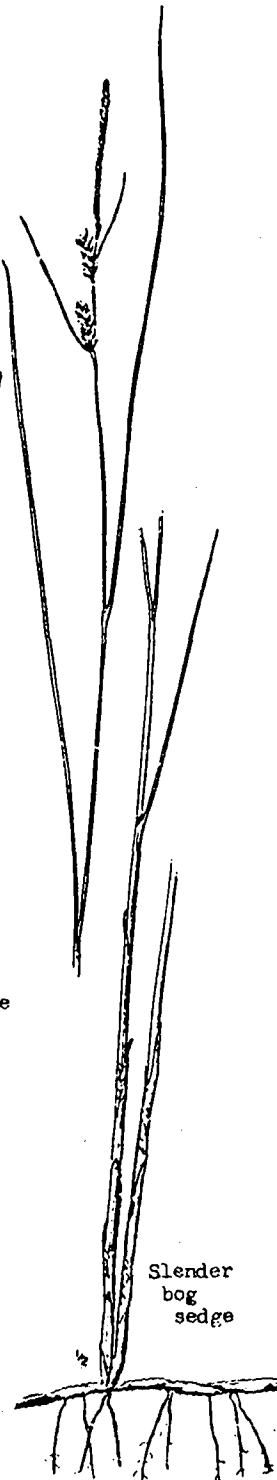
Blue wildrye



Nebraska sedge



Longstem clover



Slender bog sedge

LODGEPOLE PINE/SEDGE-GRASS WETLAND

CL-M1-11

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
Slope position: bottom
Aspect: all exposures
Slope: < 5%
Elevation: 4200 ~ 5700'
Topography: flat to concave with
depressions; drainages

SOILS

Geology: air-laid pumice alluvium/alluvium or pumice
Surface texture: sandy loam to silty loam
Al+AC depth: 8-30"
Rooting depth: 25-45"
Buried soil depth: 6-45"+
Total soil depth: 28"+
Remarks: water table within 4-5' of surface throughout
growing season. Soil surface wet or standing water
through mid July.

VEGETATION

Dominants	% Cover	Status
Lodgepole pine	20-60	Climax
Slender bog sedge	0-20	Increaser
Blue wildrye	5-30	Increaser
Meadow barley	0-70	Decreaser
Nebraska sedge	20-60	Increaser

Ground vegetation: Quaking aspen, Engelmann spruce, mountain hemlock or white fir reproduction scattered. Shrubs a minor component: honeysuckles, spirea, and blueberry can be present. Kentucky bluegrass, arnica, Stika columbine, strawberry, butterweed or arrowleaf groundsel, starry solomonplume, longstem clover common.

Revegetation: Usually not necessary. In lieu of native species use Chewings or tall fescue, meadow foxtail, orchardgrass and white clover.

Silviculture: High site productivity. Natural regeneration common, planting should not be necessary. Scarification of native vegetation required when plant. Compaction and soil displacement a hazard from wet soils during summer. Source of gopher infestation. Dwarf mistletoe and western gall rust common. Bark beetles endemic.

Range management: Critical habitat for mule deer, raptorial birds and grouse during spring-summer-fall period. Unsuitable for livestock except as transitory range following logging.

Indicators: Lush understories of sedges and grasses mixed with numerous forb species. Shrubs absent or minor component of stand.

PRODUCTIVITY

	(5 plots)				ft. 3/yr
	Forage	SI (LP)	TBA	GBA10	Index
Mean	1225	84	143	138	66
Std Error	149	3.7	23.8	20.6	12.6
5% CI	415	10	66	40	35





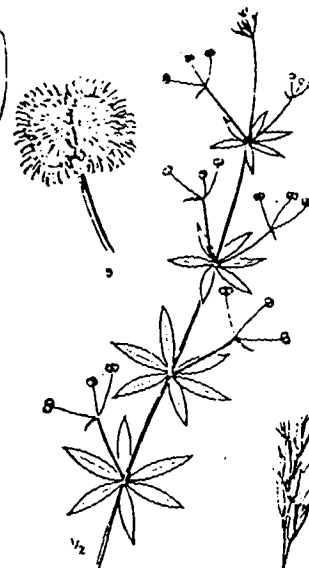
Menzies spirea



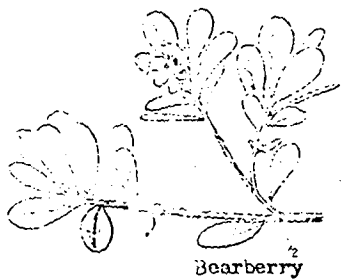
Western bog
blueberry



Purpleflower
honeysuckle



Sweetscented
bedstraw



Bearberry



Dwarf huckleberry



Fly honeysuckle



Timber
oatgrass

LODGEPOLE PINE/BLUEBERRY/FORB WETLAND

CL-M3-11

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
Slope position: bottom
Aspect: all exposures
Slope: < 3%
Elevation: 4200-5700'
Topography: flat to concave with depressions; drainages

SOILS

Geology: air-laid pumice alluvium/alluvium or pumice
Surface texture: sandy loam to fine sandy loam
Al+AC depth: 12-24"
Rooting depth: 12-50"
Buried soil depth: absent-20"
Total soil depth: 38" +
Remarks: water table within 5-6' of surface throughout growing season and within 3' in mid July.

VEGETATION

Dominants	% Cover	Status
Lodgepole pine	20-60	Climax
Dwarf huckleberry	T-40	Indicator
Westernbog blueberry	T-60	Indicator
Purpleflower honeysuckle	0-20	Indicator
Bearberry	0-30	Increaser
Menzies spirea	5-40	

Ground vegetation: Quaking aspen can be strong subordinate to lodgepole pine. Shasta red fir, white fir, Engelmann spruce, or mountain hemlock may occur as scattered reproduction. Shrubs dominate understory. Fly honeysuckle, bearberry honeysuckle and squaw currant can be present. Common herbaceous plants are timber and California oatgrass, Northern reedgrass, blue wildrye, rough bentgrass, Nebraska sedge, sprinkbank clover, strawberry, bedstraw, yarrow, western aster, scarlet paintbrush.
Revegetation: Usually not necessary. In lieu of native species use Chewings or tall fescue, meadow foxtail, orchardgrass and white clover.

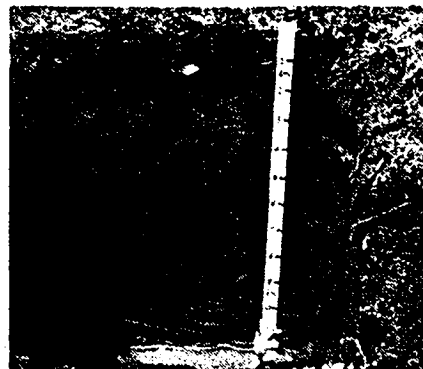
Silviculture: High site productivity. Natural regeneration common, planting should not be necessary. Scarification of native vegetation necessary when plant. Compaction and soil displacement a hazard from wet soils during summer. Multiple stems, dwarfmistletoe, western gall rust common. Gophers are very localized or absent.

Range Management: Critical habitat for mule deer, raptorial birds and grouse during spring-summer-fall period. Generally unsuitable for livestock except as a water source.

Indicators: Lush understory of low growing shrubs with rich forb component.

PRODUCTIVITY

	(12 plots)				ft. ³ /yr
	Forage	SI (LP)	TBA	GBA10	Index
Mean	105	78	150	124	54
Std Error	21.9	2.5	8.4	10.0	5.4
5% CI	61	5	19	22	12

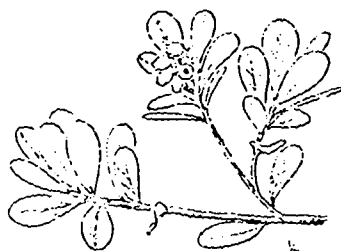




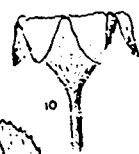
Western
aster



Longstem
clover



Bearberry



Rough bentgrass



Menzies
spirea



Onespike oatgrass

Antelope bitterbrush



LODGEPOLE PINE/BEARBERRY

CL-M2-11

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
Slope position: lower to bottom
Aspect: all exposures
Slope: 0-3%
Elevation: 4200-5500'
Topography: flat, concave, convex;
drainages, meadow edges, basins

SOILS

Geology: air-laid or flow pumice/alluvium, lava, tuff
Surface texture: loamy coarse sand to sandy loam
Al+AC depth: 9-28"
Rooting depth: 28-42"
Buried soil depth: 26-45"
Total soil depth: > 50"
Remarks: perched water table within 5' of surface during growing season. Profile colors are reduced to grey. Iron staining common in C horizon. C horizon moist throughout year.

VEGETATION

Dominants	% Cover	Status
Lodgepole pine	20-55	Climax
Bearberry	7-65	Increaser
Bitterbrush	0-2	Decreaser
Spirea	0-20	Increaser with disturbance

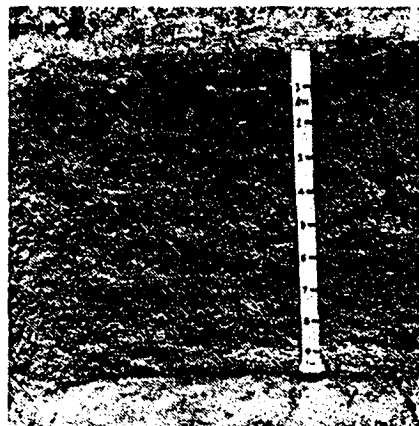
Ground vegetation: Ponderosa pine can be present as scattered regeneration. Bitterbrush very subordinate. Common grasses are onespike oatgrass, rough bentgrass, squirreltail and Ross sedge. Forb layer dominated by clover, smallflower penstemon, western aster, yarrow, tawny horkelia and western buttercup.

Revegetation: Moisture regime favorable for introduction or orchardgrass, tall fescue, hard fescue, Chewings fescue.

Silviculture: Moderate site productivity. Natural regeneration common in least disturbed stands. Favor lodgepole pine in management. Compaction a hazard from moist soils during summer. Dwarfmistletoe common. Pocket gophers common, will increase after logging. Silviculture should favor wildlife preferences.

Range and Wildlife management: Preferred habitat for deer in mid and late summer. Nesting for rapitorial birds when next to meadows. Source of shade for livestock using adjacent meadow sites.

Indicators: Prevalence of bearberry in association with numerous perennial forbs.



PRODUCTIVITY

(8 plots)

	Forage	SI (LP)	TBA	GBA10	ft. 3/yr Index
Mean	33	79	120	94	42
Std Error	13.3	2.1	10.3	12.3	6.0
5% CI	*	5	24	29	14

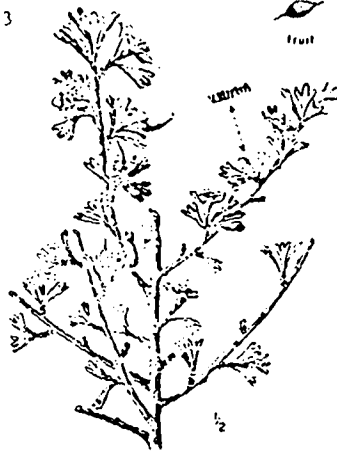
* Data too variable for 5% CI estimate.



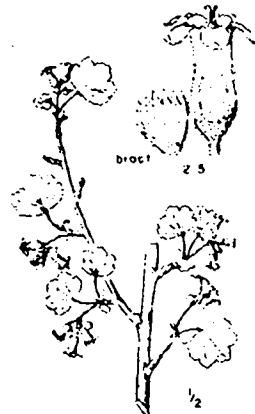
Western yarrow



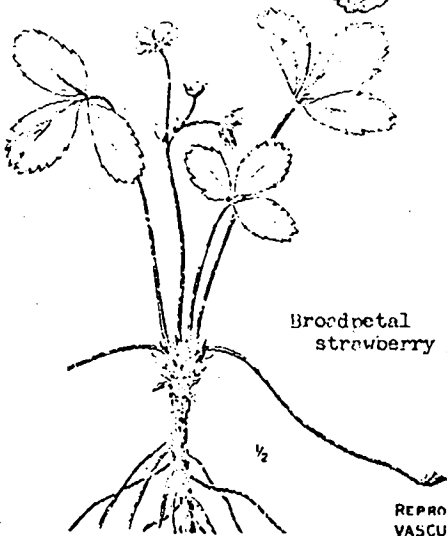
Shalfower
penstemon



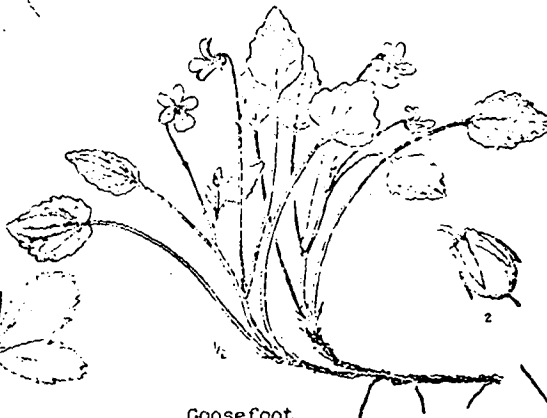
Antelope bitterbrush



Squaw currant



Broadpetal
strawberry



Goosefoot
violet



Western
needlegrass

LODGEPOLE PINE/BITTERBRUSH/FORB

CL-S2-13

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
Slope position: lower to bottom
Aspect: all aspects
Slope: 1-6%
Elevation: 4200-5700'
Topography: flat, concave, convex;
slope of drainages, basin, plateau.

SOILS

Geology: air-laid or flow pumice/alluvium, lava, tuff
Surface texture: loamy coarse sand to sandy loam
Alt+AC depth: 9-28"
Rooting depth: 28-42"
Buried soil depth: 25-75"
Total soil depth: 50" +
Remarks: perched water table within 5' of surface early in growing season. Some profiles may appear well drained by mid summer. Profile colors usually reduced to grays or remain buff-colored. Iron stainings occasional.

VEGETATION

Dominants	% Cover	Status
Lodgepole pine	20-50	Climax
Bitterbrush	7-45	Decreaser
Needlegrass	< 5	Increaser

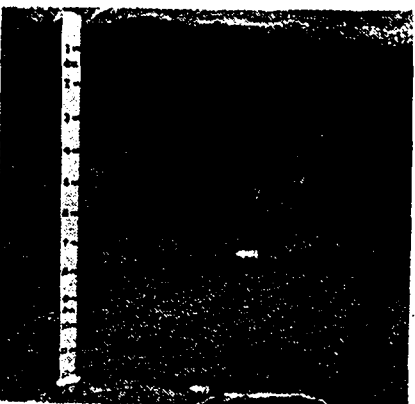
Ground vegetation: Ponderosa pine and/or white fir can be present as scattered reproduction. Bearberry and spirea, if present very subordinate to bitterbrush. Squaw currant or goldenweed present but rarely common. Common herbaceous plants are needlegrass, squirreltail, Ross sedge, strawberry, smallflower penstemon, yarrow, goosefoot violet, least lupine, pussytoes, and tawny horkelia.

Revegetation: Moisture regime favorable for introduction of intermediate wheatgrass, orchardgrass and hard fescue.

Silviculture: Moderate site productivity but slightly lower than bearberry sites. Natural regeneration common and can be established if seed source provided. Favor lodgepole pine in management. Compaction a hazard from moist soils during summer. Dwarfmistletoe and western gall rust common. Gophers absent if site not associated with meadow types.

Range management: Preferred habitat for mule deer. Bitterbrush heavily hedged in many stands. Important habitat for raptorial and song birds. Use as transitory livestock forage.

Indicators: Prevalence of bitterbrush in association with numerous perennial forbs. Currant and goldenweed will increase after site disturbance.



PRODUCTIVITY

(12 plots)

	Forage	SI (LP)	TBA	GBA10	ft. ³ /yr Index
Mean	24	71	112	87	34
Std Error	7.7	2.3	6.4	4.6	2.0
5% CI	20	5	14	10	4



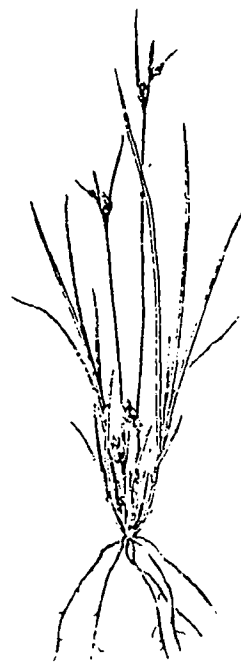
Big sagebrush



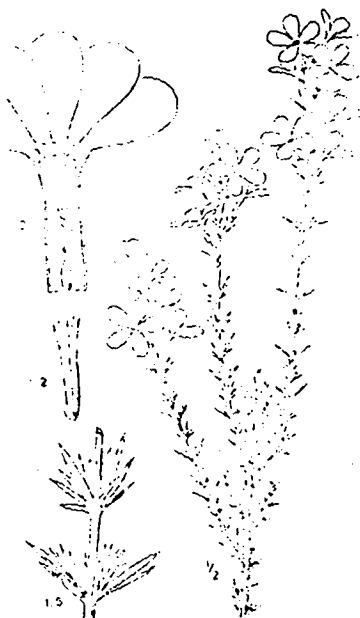
Antelope bitterbrush



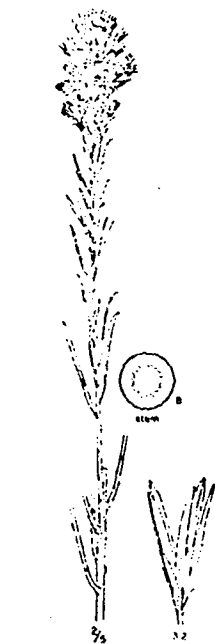
Sulfur eriogonum



Ross sedge



Linanthastrum



Tall gray rabbitbrush



Gray horsebrush



Woolly eriophyllum

LODGEPOLE PINE/SAGEBRUSH (RHYOLITE)

CL-S1-12

ENVIRONMENT

Location: Ft. Rock RD, Deschutes NF
Slope position: mid to lower third
Aspect: all exposures
Slope: 0-8%
Elevation: 4800-4900'
Topography: microridge/swale of
basalt flow landform

SOILS

Geology: Newberry rhyolite pumice/Mazama dacite pumice/
basalt flow or alluvium.
Surface texture: loamy coarse sand to sand
Al+AC depth: 7-12"
Rooting depth: 20-60"
Buried soil depth: 13-24"
Total soil depth: 24-70"
Remarks: well-drained profile. Newberry pumice
particle size to 40mm in C horizon; coarse fragments
to 95% by volume. Mazama pumice to 15mm and 30%
coarse fragments.

VEGETATION

Dominants	% Cover	Status
Lodgepole pine	5-30	Climax
Big sagebrush	3-20	Increaser
Bitterbrush	0-7	Decreaser
Sulfur eriogonum	T-10	Decreaser
Ross sedge	T-20	Increaser
Squirreltail	3-10	Increaser

Ground vegetation: Lodgepole pine clearly dominates
overstory. Ponderosa pine reproduction may be occasional.
Bitterbrush usually subordinate to sagebrush. Gray
rabbitbrush, granitegilia, squaw currant, and horsebrush
can be present. Common herbaceous plants are western
needlegrass, cushion buckwheat, hoary aster, woolly
eriophyllum, yarrow, woolly groundsel, rockcress, and
Brewer monkeyflower.

Revegetation: Maintain a bitterbrush complement for
game browse. Domestic grass seeding not recommended.

Silviculture: Moderately low site productivity. Natural
and artificial regeneration difficult to establish due to
characteristics of rhyolite pumice. Community classifies
marginal at best. Favor lodgepole pine in management.
Gophers occasional. Very little dwarfmistletoe. Frost
heaving on exposed sites.

Range management: Important as deer and antelope late
fall-winter, early spring habitat. Browse competition
with wildlife and poor herbaceous production make
community unsuitable for livestock.

Indicators: Aggregated stands of lodgepole pine with
sagebrush-bitterbrush understory. Expect rabbitbrush to
increase with logging, burning, or spraying; sagebrush
will increase with livestock grazing.

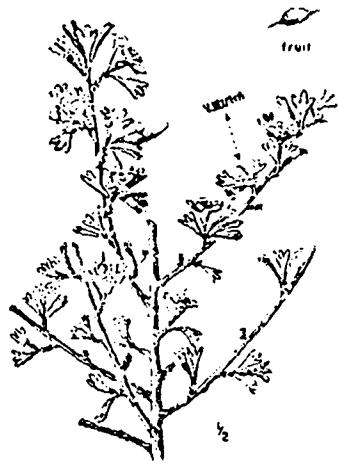
PRODUCTIVITY

(2 plots)

	SI (LP)	TBA*	GBA10	ft. ³ /yr Index
Mean	68	57	68	28
Std Error	3.7	11.8	19.9	5.7
Range	64-71	20-85	48-88	17-35

* 5 sample plots

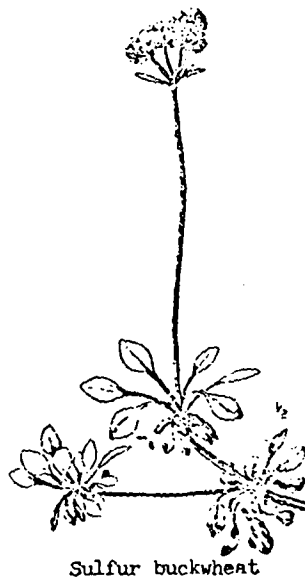




Antelope bitterbrush



Big sagebrush



Sulfur buckwheat



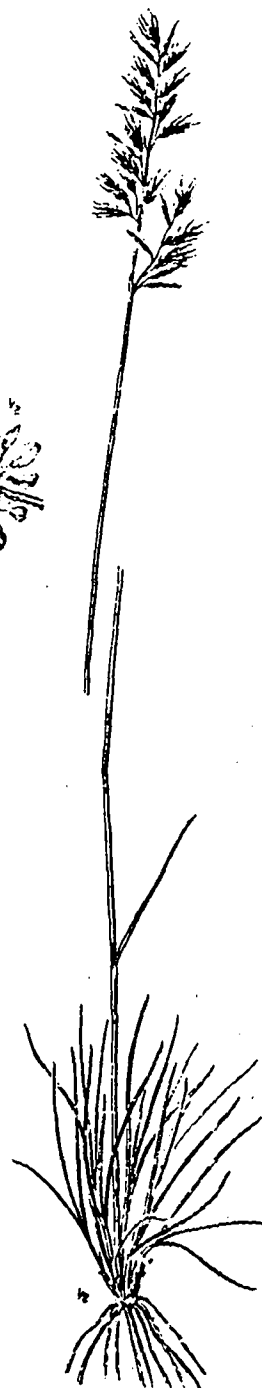
Smallflower penstemon



Woolly eriophyllum



Tall green rabbitbrush



Idaho fescue

LODGEPOLE PINE/SAGEBRUSH/FESCUE

CL-S1-11

ENVIRONMENT

Location: Ft Rock RD, Deschutes NF
Slope position: lower third
Aspect: all aspects
Slope: less than 8%
Elevation: 4700 - 4800'
Topography: slightly convex; plateaus

SOILS

Geology: Mazama air-laid pumice/lava or alluvium
Surface texture: loamy sand
Al+AC depth: 30"
Rooting depth: 30"
Buried soil depth: 30"
Total soil depth: 36"
Remarks: well drained profile with less than 6" of
Newberry rhyolite pumice over Mazama pumice.

VEGETATION

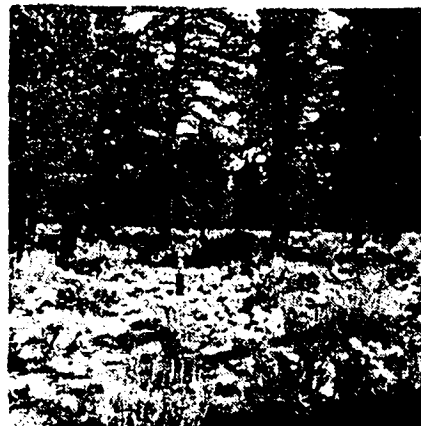
<u>Dominants</u>	<u>% Cover</u>	<u>Status</u>
Lodgepole pine	5-15	
Big sagebrush	10	Increaser
Idaho fescue	10-20	Decreaser

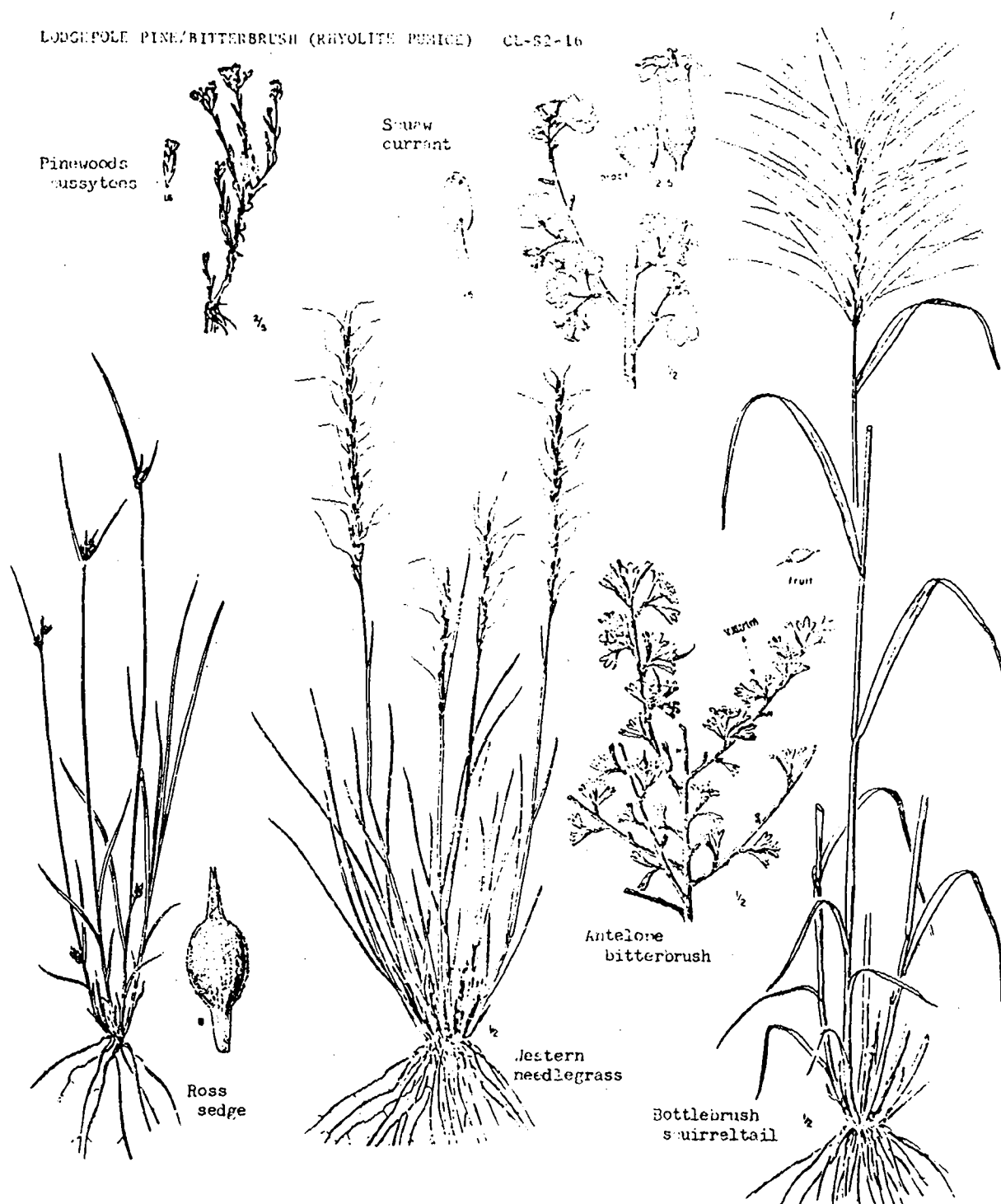
Ground vegetation: Bitterbrush, sulfur eriogonum and green rabbitbrush subordinate to big sagebrush. Idaho fescue of poor vigor and may occur as isolated colonies. Ross sedge, needlegrass and squirreltail subordinate to fescue. Forbs rare. Woolly eriophyllum and smallflower penstemon are most common forbs.

Revegetation: Treatment of big sagebrush leads to Idaho fescue dominance.

Silviculture: Productivity unknown but suspected to be low. Manage for lodgepole pine. Natural regeneration rare. Planting requires scarification of fescue and sagebrush competition and may be impractical.

Range management: Used in early spring by mule deer and antelope. Livestock must be forced to utilize Idaho fescue. Maintain bitterbrush in stand for wildlife considerations. Expect increase in rabbitbrush and squirreltail with site disturbance.





LODGEPOLE PINE/BITTERBRUSH (RHYOLITE PUMICE)

CL-S2-16

ENVIRONMENT

Location: Ft. Rock RD, Deschutes NF
Slope position: middle third
Aspect: all exposures
Slope: 0-15%
Elevation: 4800-5300'
Topography: ridge/swale; basalt flows
benches and butte toe slopes.

SOILS

Geology: Newberry rhyolite pumice/Mazama pumice/basalt
flow or tuff
Surface texture: coarse sandy to loamy coarse sand
Al+AC depth: 5-10"
Rooting depth: 20-60"
Buried soil depth: 9-36"
Total soil depth: 28-70"
Remarks: well drained profiles. Rhyolite pumice lies
discontinuous over Mazama dacite pumice. Cl pumice
to 57mm diameter and 90% coarse fragments.

VEGETATION

Dominants	% Cover	Status
Lodgepole pine	10-40	Climax/seral
Ponderosa pine	0-7	Climax
Bitterbrush	5-20	Decreaser
Squaw currant	T-5	Increaser
Ross sedge	T-5	Increaser
Needlegrass	T-5	Increaser

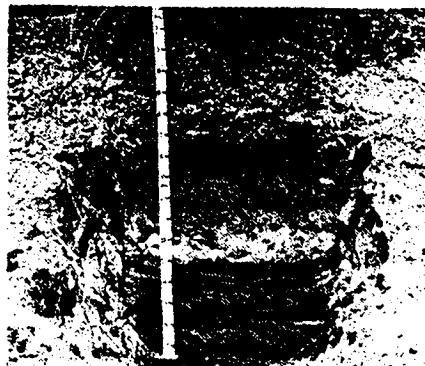
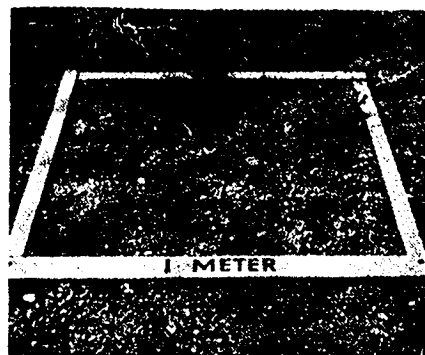
Ground vegetation: Ponderosa pine mainly as regeneration,
never very prominent. Bitterbrush dominant. Currant and
goldenweed as subordinants. Herbaceous layer depauperate.
Common forbs are yarrow, strawberry, pussytoes, and small-
flower penstemon.

Revegetation: Should not be attempted on coarse pumice
soils. Bitterbrush can be planted if underlying soil
mixed with rhyolite.

Silviculture: Low tree productivity. Natural regenera-
tion established under shelterwood situation. Artificial
regeneration necessary for clearcuts and heavy shelter-
woods. Mix buried soil with rhyolitic pumice. Dwarf-
mistletoe occasional. No pocket gophers.

Range management: Spring-summer range for mule deer.
Bitterbrush moderate to heavily browsed. Sufficient
herbage for livestock only after logging, otherwise
allocate to wildlife.

Indicators: With logging or burning have increase in
squirreltail, Ross sedge and squaw currant. Soil surface
covered with coarse Newberry rhyolitic pumice. Absence
of big sagebrush.



PRODUCTIVITY

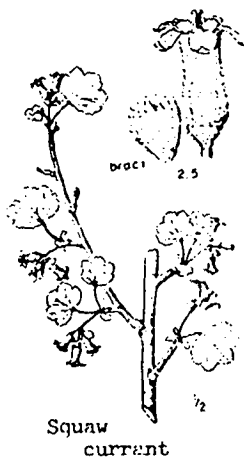
(2 plots)

	SI (LP)	TBA*	CBA10	ft. ³ /yr Index
Mean	60	110	91	30
Std Error	1.4	8.5	12.9	3.5
Range	58-61	90-130	79-104	26-34

* 4 sample plots



Smallflower
penstemon



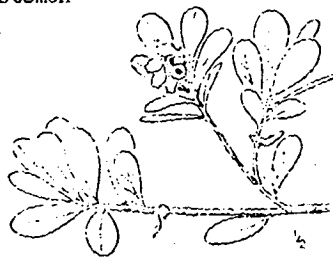
Squaw
currant



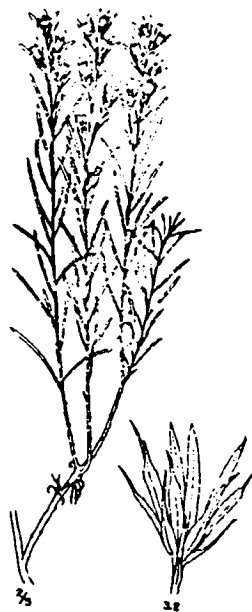
Antelope
bitterbrush



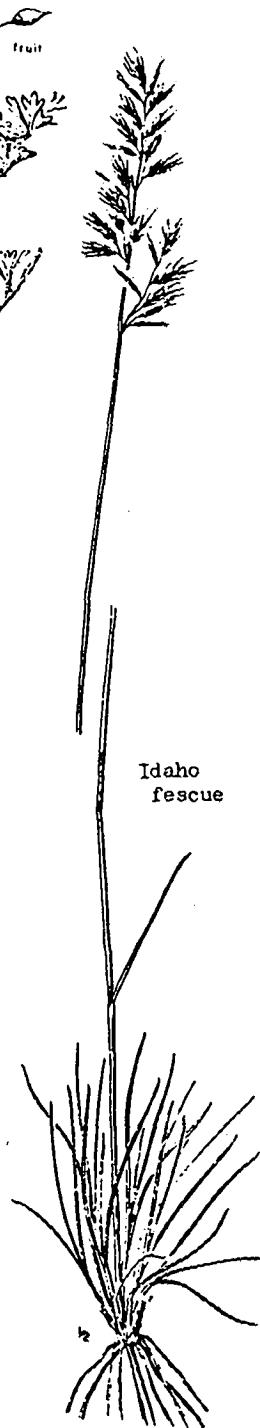
Longstem
clover



Bearberry



Rabbitbrush
goldenweed



Idaho
fescue

LODGEPOLE PINE/BITTERBRUSH/FESCUE

CL-S2-14

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
Slope position: bottom to mid third
Aspect: all exposures
Slope: 0-8%
Elevation: 4200-5700 (6100)'
Topography: flat to concave; basins
swales, drainages, terraces.

SOILS

Geology: air-laid or flow pumice alluvium/lava flow
Surface texture: loamy coarse sand to sandy loam
Al+AC depth: 13-40"
Rooting depth: 20-60"
Buried soil depth: 15-60"
Total soil depth: 34-70"
Remarks: rooting zone well mixed. Noticeable lack of coarse Cl pumice. Particle size 5-30mm in AC horizon, coarse fragments \leq 50% by volume. Pumice flow as an overburden gives same effective environment.

VEGETATION

Dominants	% Cover	Status
Lodgepole pine	35-60	Climax under disturbance
Bitterbrush	0-25	Decreaser
Idaho fescue	5-30	Decreaser

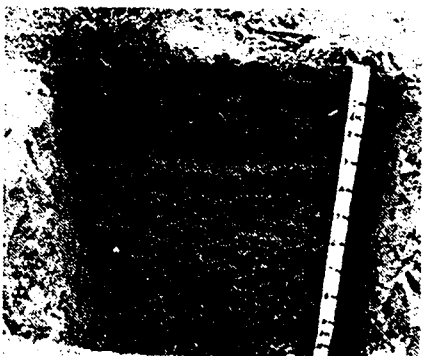
Ground vegetation: Ponderosa pine becomes common in understory with gain in elevation. Bitterbrush absent from stands having seasonal water tables. Squaw currant, goldenweed, and/or bearberry weak subordinates. Common herbs are western needlegrass, squirreltail, Ross sedge, strawberry, long-stem clover, smallflower penstemon, yarrow, horkelia, tailcup lupine.

Revegetation: Fescue dominates after ground disturbance. Scarification necessary to establish shrubs. Domestic grasses are hard fescue, intermediate wheat, orchardgrass, smooth brome suggested.

Silviculture: Moderate site productivity. Natural regeneration difficult to establish with presence of lodgepole pine. Seasonal water tables may restrict operability. Dwarfmistletoe with moderate intensity. Pocket gophers absent.

Range management: Spring and summer range for mule deer. Spring use on forbs and grasses, summer use on shrubs. Must force livestock use of fescue by fencing and water haul.

Indicators: Goldenweed and squaw currant increase with site disturbance. Fescue competition slows reestablishment of bitterbrush and lodgepole pine after logging or burning.

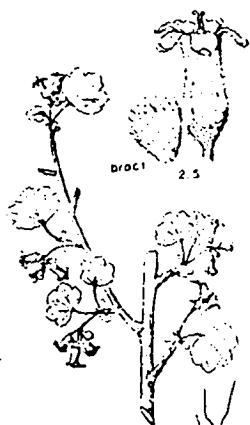


PRODUCTIVITY

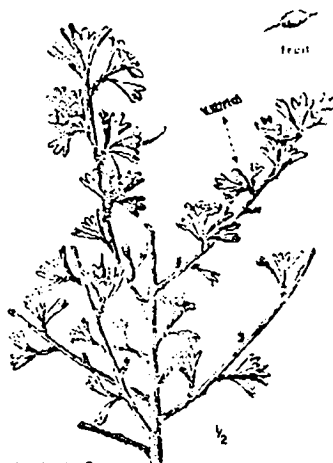
(19 plots)

	Forage	SI (LP)	TBA	CBA10	ft. ³ /yr Index
Mean	75	75	115	105	43
Std Error	9.0	1.2	4.9	5.4	2.6
5% CI	20	3	10	11	5

Squaw
currant



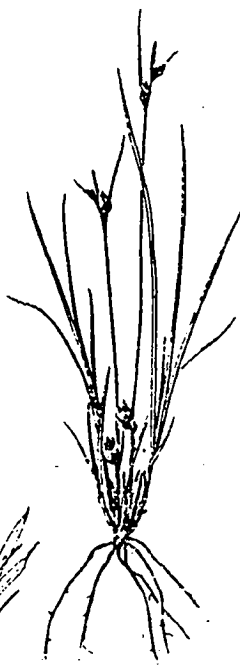
Antelope
bitterbrush



Rabbitbrush
goldenweed



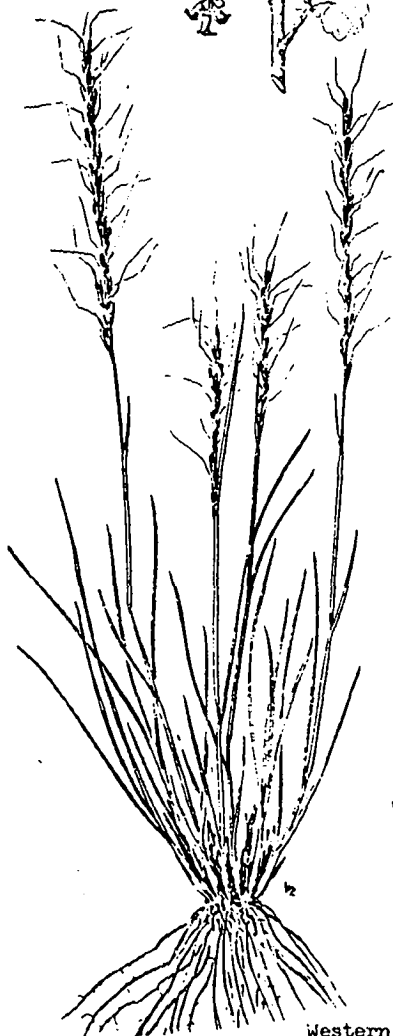
Ross sedge



Bottlebrush
squirreltail



Western needlegrass



LODGEPOLE PINE/BITTERBRUSH/NEEDLEGRASS

C1-S2-11

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
Slope position: lower to mid third
Aspect: all exposures
Slope: 1-12%
Elevation: 4200-5700 (6000)
Topography: flat to convex; basins, plateaus, benches, escarpment back slopes

SOILS

Geology: air-laid or redeposited pumice/lavas, alluvium, tuff
Surface texture: loamy coarse sand to loamy sand
Al+AC depth: 6-18 (30)"
Rooting depth: 15-40"
Buried soil depth: 27- <80"
Total soil depth: 30- <100"
Remarks: soils from Chemult and Panhandle area derived from pumice flow. Alluvial soils common at base of Cascades. C1 pumice to 40mm diameter with 60-70% of horizon in coarse fragments

VEGETATION

Dominants	% Cover	Status
Lodgepole pine	20-50	Climax with periodic disturbance
Ponderosa pine	≤ 5	Climax in peripheral stands
Bitterbrush	>10	Decreaser/increaser
Squaw currant	1-5	Increaser
Western needlegrass	3-5	Increaser

Ground vegetation: Ponderosa pine in understory on steeper slopes or adjacent to elevated ground. Goldenweed and squaw currant definitely subordinate to bitterbrush, but may increase after disturbance via logging or burning. Bitterbrush not aggregated to tree understory. Common plants are squirreltail, Ross sedge, least lupine, phacelia, goosefoot violet, pinewoods pussytoes, woolly eriophyllum, strawberry.

Revegetation: Introduction of domestic species on disturbed sites not recommended except for browse planting of bitterbrush.

Silviculture: Moderate site productivity. Natural regeneration difficult to establish except near seedwalls, shelterwoods with 30-40 ft/A standing, and at higher elevations. Predictability of naturals difficult within 3-5 year intervals. Expect pocket gophers after disturbance when site near mesic communities. Dwarfmistletoe and western gall rust highly variable.

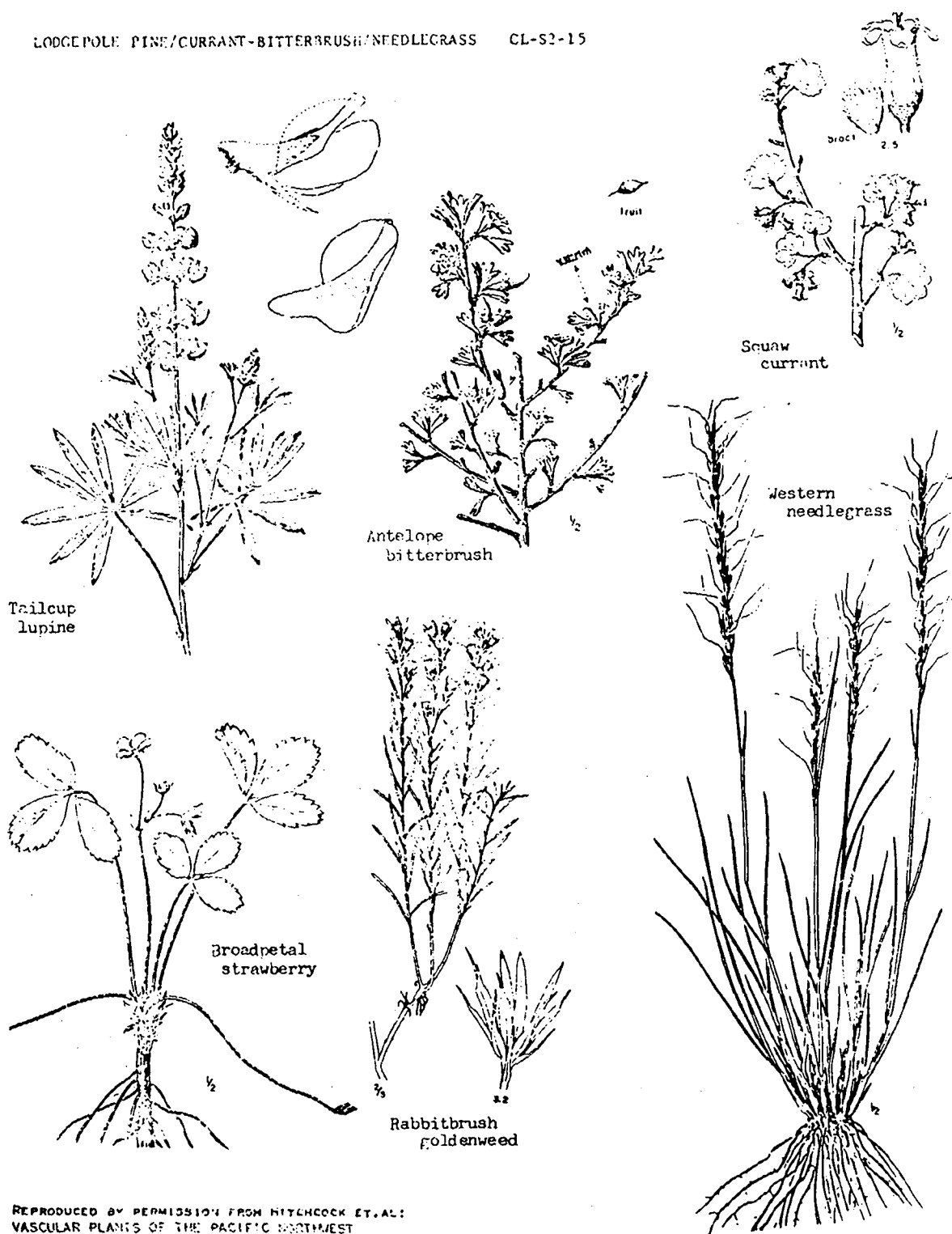
Range management: Summer range for mule deer. Physical barriers may be limiting to livestock under natural conditions. Bitterbrush as main forage. Provides transitory range after logging with increase of native grasses to 90%/A within 3 years.

Indicators: Presence of manzanita or snowbrush suggest seral stands to ponderosa pine. Currant may be prevalent on alluvial soils and adjacent to ponderosa pine types upslope. Squirreltail, goldenweed, and bitterbrush increase with disturbance; latter decreases under grazing. Frost heaving in larger openings of tree canopy.

PRODUCTIVITY		(31 plots)			
	Forage	SI (LP)	TBA	GBA10	ft. ³ /yr Index
Mean	11	76	112	81	35
Std Error	2.2	1.4	3.4	3.7	2.1
5% CI	5	3	7	8	4

Note: Fremont data significantly lower than Deschutes and Winema in stocking level but not site index.





LODGEPOLE PINE/CURRENT-BITTERBRUSH/NEEDLEGRASS

CL-S2-15

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
Slope position: lower to mid
Aspect: west, south, east
Slope: 2-15%
Elevation: 5700-6600'
Topography: undulating to steep
rolling convex slopes off buttes,
ridges.

SOILS

Geology: air-laid pumice/lava colluvium
Surface texture: loamy coarse sand to coarse sandy
loam
Al+AC depth: < 20"
Rooting depth: 15-40"
Buried soil depth: 27- > 80"
Total soil depth: 30- > 100"
Remarks: profiles are well-drained and usually
coarse-textured. Community may occur on re-
deposited pumice overlying in place air-laid
pumice.

VEGETATION

Dominants	% Cover	Status
Lodgepole pine	10-35	Climax/seral
Squaw currant	5-40	Increaser
Bitterbrush	0-20	Decreaser
Needlegrass	3-10	Increaser

Ground vegetation: White fir or ponderosa pine occasional as regeneration. Squaw currant codominant with or dominant over bitterbrush; latter can be absent. Goldenweed and/or pinemat manzanita subordinate (< 5% cover) in some stands. Common herbaceous plants are Ross sedge, tailcup lupine, and strawberry. Fireweed, princespine, kelloggia, pussypaws may be present.

Revegetation: Introduction of domestic species not recommended due to coarse-textured soils and severe microclimates.

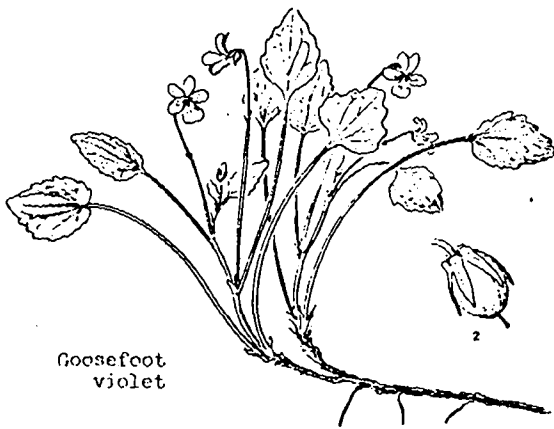
Silviculture: Moderate site productivity. Natural regeneration present but not aggregated. Clearcutting and heavy shelterwood favors lodgepole. Expect conversion to white fir with selection or light shelterwood on more elevated or mesic sites. Lodgepole successional after burning. Bark beetles present in many stands. Dwarf-mistletoe and western gall rust common. Gophers absent or very occasional.

Range Management: Summer range for mule deer. Bitterbrush receives grazing pressure. Nonrange for livestock except as transitory forage following logging.

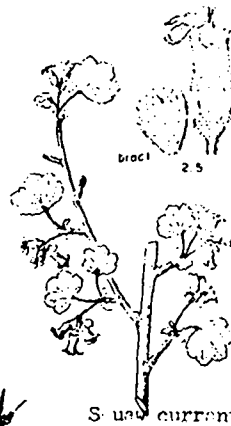
Indicators: Predominance of squaw currant in relation to bitterbrush, latter more common at lower elevations. Increase of western needlegrass, currant, goldenweed with logging or burning.



PRODUCTIVITY	(5 plots from Fremont NF)			
	SI (LP)	TBA	GBA10	ft. ³ /yr Index
Mean	67	124	76	33
Std Error	2.1	11.7	8.1	5.6
5% CI	6	32	22	15



Goosefoot
violet



Snow current



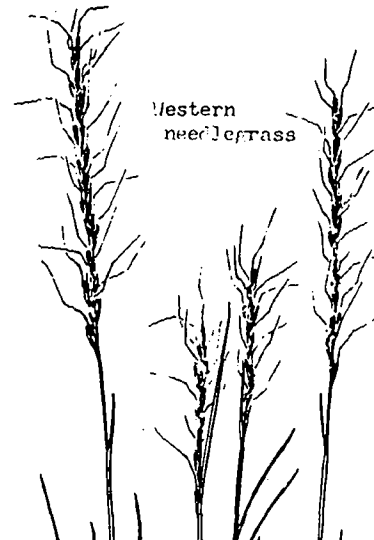
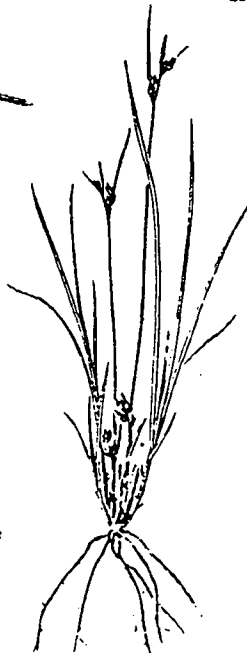
Sulfur buckwheat



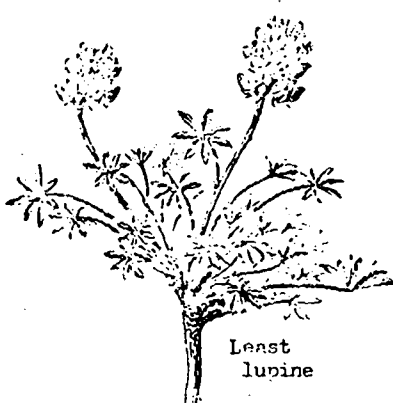
Antelope
bitterbrush



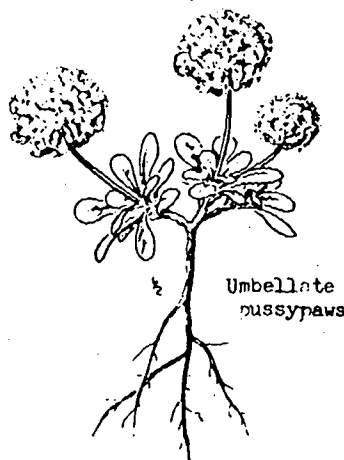
Ross
sedge



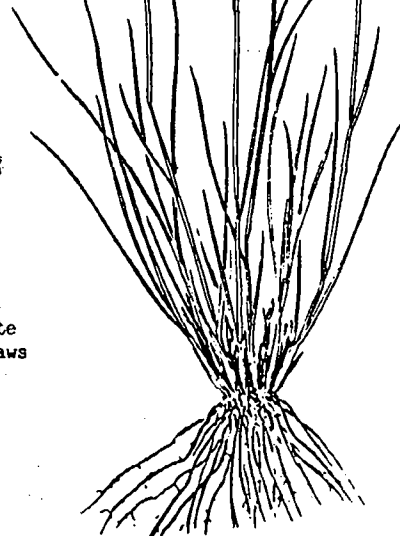
Western
needlegrass



Least
lupine



Umbellate
pussypaws



LODGEPOLE PINE/NEEDLEGRASS BASINS

CL-G3-11

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
Slope position: lower third to bottom
Aspect: all exposures
Slope: < 5%
Elevation: 4600-5700' (6200)
Topography: flat to concave; basins, flats, benches

SOILS

Geology: air-laid, overland flow or alluvial pumice
Surface texture: coarse sand to loamy sand
Al+AC depth: 7-15"
Rooting depth: 20-48"
Buried soil depth: absent > 100
Total soil depth: 24-90"+
Remarks: topographic positions which accumulate cold air. Frost heaving very common. C1 horizon pumice < 45mm diameter. Coarse gravels are 50-70% of horizon by volume.

VEGETATION

Dominants	% Cover	Status
Lodgepole pine	35	Climax
Bitterbrush	10	Decreaser
Western needlegrass	1-6	Increaser

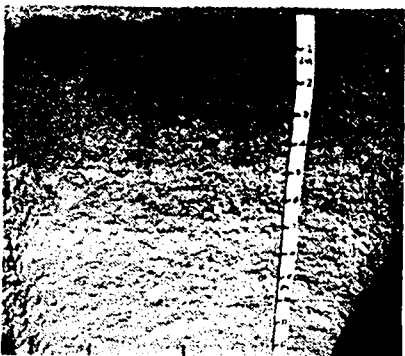
Ground vegetation: Bitterbrush strongly aggregated to shrub understory; not a stand dominant. Tree regeneration restricted to shrub and tree understory. Common herbaceous plants are sulfur buckwheat, least lupine; goosefoot violet, pussypaws, Ross sedge, and squirrel-tail.

Revegetation: Use of domestic species not recommended due to frost heaving and shallow rooting medium.

Silviculture: Very low tree productivity. Natural regeneration very difficult to establish except under shrubs or trees. Success of planting is relatively unknown. Pocket gophers occasional except in vicinity of a more mesic community. Dwarfmistletoe locally common

Range management: Summer mule deer habitat. Nonrange to livestock in good to excellent condition. Mixing of Al and AC stimulates native grass production.

Indicators: Stand reverts to shrub-grass dominance for many years following burning. Squaw currant may be common. Strong aggregation of bitterbrush, and an open tree spacing characterize the community.



PRODUCTIVITY

(24 plots)

	Forage	SI (LP)	TBA	GSAIG	ft. 3/yr Index
Mean	12	62	81	56	20
Std Error	2.1	2.3	4.8	5.5	2.5
5% CI	5	5	10	11	5

Note: Fremont data significantly lower than Deschutes and Winema NF data.



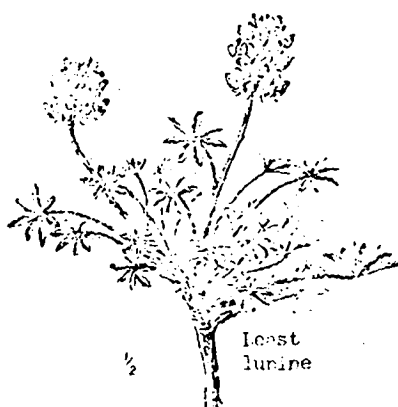
Small to medium



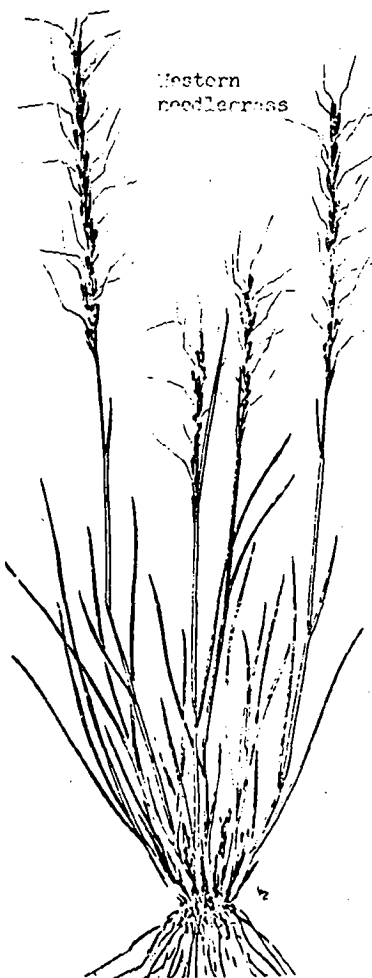
Small to medium



Long-stolon sedge



Least lucine



Western needlegrass

LODGEPOLE PINE/SEDGE-NEEDLEGRASS BASINS

CL-G4-13

ENVIRONMENT

Location: Deschutes, Winema NF
Slope position: lower third
Aspect: southeast, north
Slope: 0-5%
Elevation: 5300-6300'
Topography: flat to concave microrelief of basins and plateaus.

SOILS

Geology: redeposited air-laid pumice/pumice or alluvium
Surface texture: loamy sand
Al+AC depth: 5-12"
Rooting depth: less than 36"
Buried soil depth: unknown
Total soil depth: unknown
Remarks: well-drained profiles of high elevation basins within Cascade Range. Frost heaving is common phenomenon.

VEGETATION

Dominants	% Cover	Status
Lodgepole pine	10-30	Climax
Long-stolon sedge	T-30	Increaser
Needlegrass	< 5	Increaser

Ground vegetation: Scattered regeneration of Shasta red fir, western white pine or ponderosa pine within canopy influence of lodgepole pine. Minor accounts of sulfur eriogonum, snowbrush, greenleaf and pinemat manzanita can occur. Prominent life form is grasses. Forbs represented by yarrow, rockcress, least lupine, pussypaws.

Revegetation: Not recommended due to severe microclimate.

Silviculture: Very low site productivity. Natural regeneration scarce as result of frost heaving or mid-summer deciscation. Success of planting lodgepole pine unknown. Trees heavily infected with dwarfmistletoe.

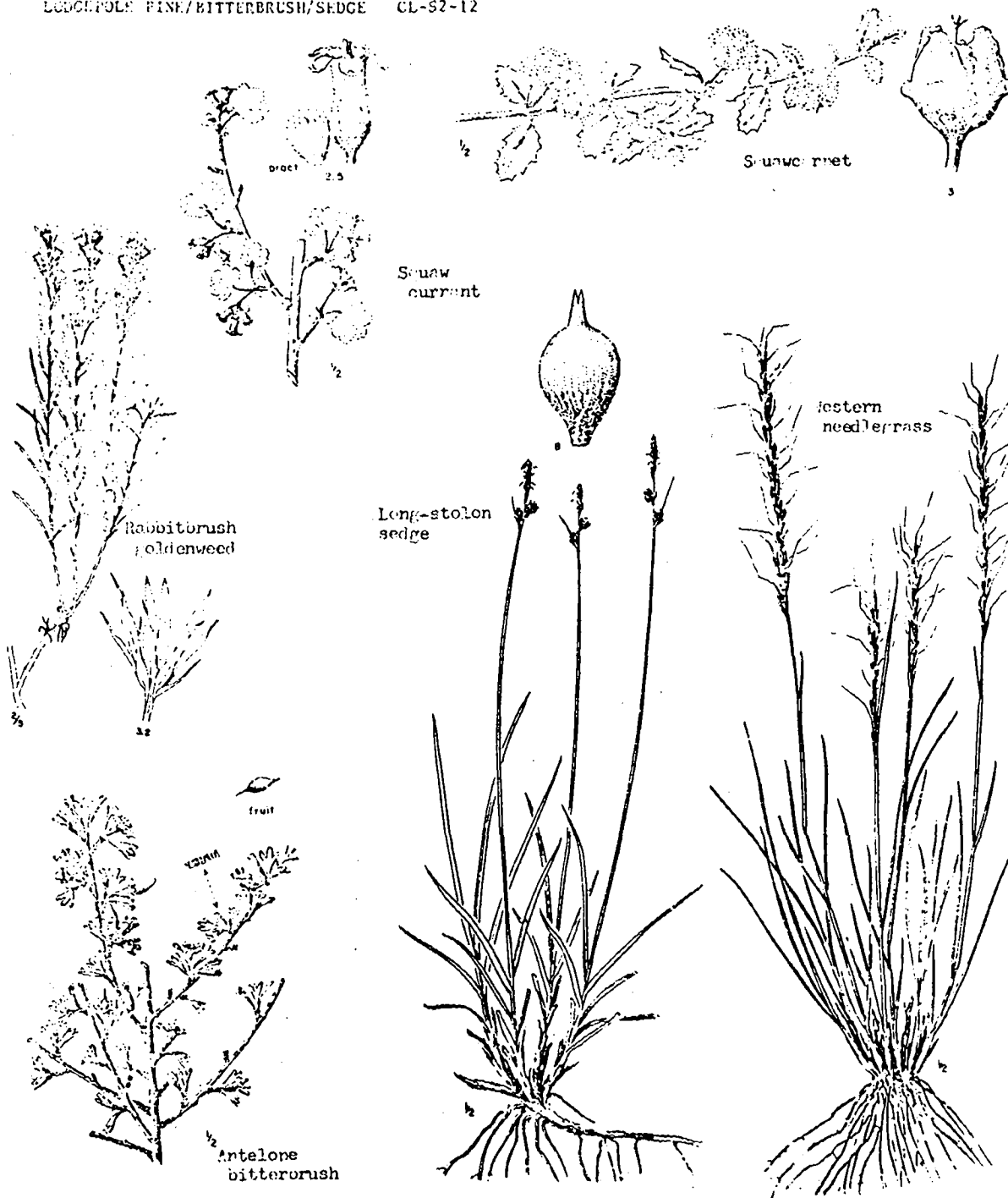
Range Management: Summer range for mule deer. Non-range for livestock due to low herbage production.

Indicators: Noticeable lack of shrubs as dominant life form. Basin sites with grasses prevalent. Soil disturbance will give increase in sedge, squirreltail and western needlegrass.



PRODUCTIVITY	(2 plots)			ft. ³ /yr Index
	SI (LP)	TBA	GBA10	
Mean	61	78	40	13
Std Error	5.1	7.5	3.6	.05
5% CI	*	*	*	*

* Data too variable for confidence interval



LODGEPOLE PINE/BITTERBRUSH/SEDGE

CL-S2-12

ENVIRONMENT

Location: Deschutes and Winema NF
Slope position: lower to mid third
Aspect: north, east, south
Slope: 0-40%
Elevation: 4500-5400'
Topography: flat to microridge/swale;
basins, benches, plateaus.

SOILS

Geology: basic scoria flow, pumice alluvium, fine
air-laid pumice
Surface texture: loamy coarse sand to sandy loam
Alt+AC depth: 8-23"
Rooting depth: 36-48"
Buried soil depth: 27-40"
Total soil depth: 50"
Remarks: profile well-drained. Cobble and coarse
fragment content various. Many profiles with
numerous discontinuous layers of reworked pumice or
scoria flow.

VEGETATION

Dominants	% Cover	Status
Lodgepole pine	20-50	Climax
Bitterbrush	4-26	Decreaser
Squaw currant	T-3	Increaser
Long-stolon sedge	1-12	Increaser
Western needlegrass	1-9	Increaser

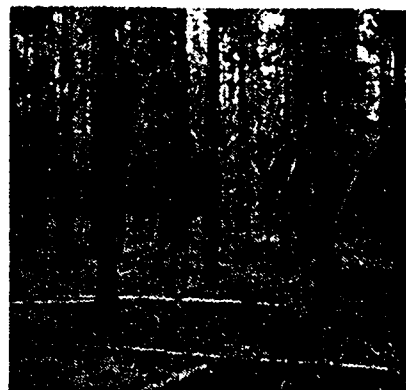
Ground vegetation: Ponderosa pine, white fir, or
Shasta red fir present where community lies adjacent
to elevated ground. Squaw currant, squawcarpet, and
goldenweed subdominant. With gain in elevation,
currant may dominate over bitterbrush. Other under-
story plants are squirreltail, Ross sedge, sulfur buck-
wheat, least lupine, pyrola, princespine, and Nuttall
violet. Anderson or silvery lupine absent.

Revegetation: Expansion of sedge with disturbance.
Seeding domestic species is marginal, mountain brome,
orchardgrass and intermediate wheat suggested. Retain a
bitterbrush complement.

Silviculture: Moderately high site productivity.
Natural regeneration of lodgepole common. Scarification
necessary for planting. Goldenweed and sedge increases
following soil displacement during logging. Dwarfmistle-
toe and gophers are not prevalent except in very local
situations.

Range management: Summer range for mule deer. Use as
transitory livestock range following tree harvest.

Indicators: Bitterbrush in association with long-stolon
sedge and needlegrass. Disturbed sites may have pre-
dominance of sedge, goldenweed, and squaw currant with
bitterbrush subordinate.



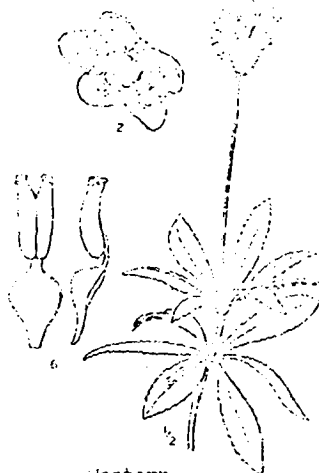
PRODUCTIVITY

(5 plots)

	Forage	SI (LP)	TBA	GBA10	ft. 3/yr Index
Mean	16	85	146	136	57
Std Error	1.9	2.6	18.9	12.8	8.3
5% CI	5	7	52	40	23



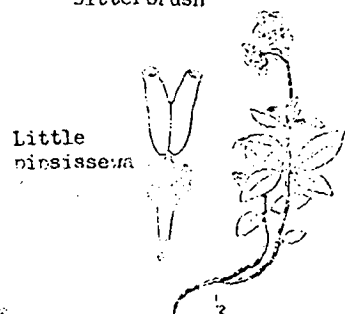
Pinemat
manzanita



Western
princespine



Antelope
bitterbrush



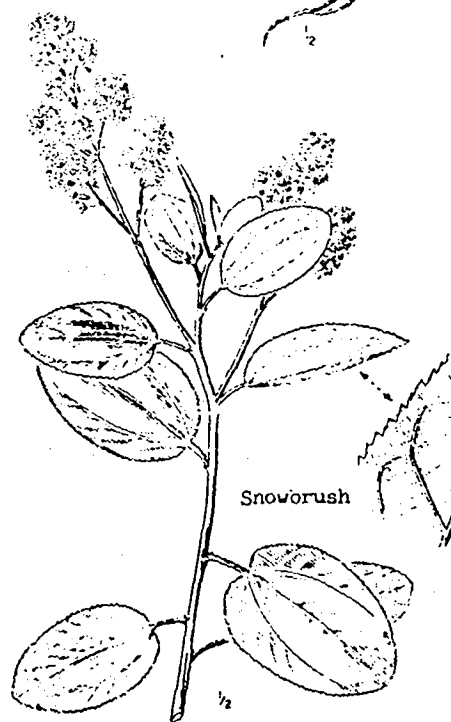
Little
prinsisseum



Greenleaf
manzanita



Fireweed



Snowrush

LODGEPOLE PINE/SNOWBRUSH-MANZANITA

CL-S9-11

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
Slope position: lower to upper third
Aspect: all aspects
Slope: 2-15%
Elevation: 4800-6000'
Topography: flat, concave, convex slopes; benches, plateaus, lower slopes of escarpments or buttes.

SOILS

Geology: air-laid pumice/lava colluvium
Surface texture: loamy sand to loamy coarse sand
Al+AC depth: 13-30"
Rooting depth: 25-40"
Buried soil depth: 26 >100"
Total soil depth: > 50"
Remarks: surface deposits can be in place or redeposited pumice. Profiles well drained and coarse textured. Cl horizon pumice to 35mm diameter and to 80% coarse fragments by volume.

VEGETATION

Dominants	% Cover	Status
Lodgepole pine	10-40	Successional
Ponderosa pine	0-18	Climax
White fir	0-7	Climax
Snowbrush	T-60	Increaser
Greenleaf manzanita	T-20	Increaser
Pinemat manzanita	0-10	Increaser
Bitterbrush	0-20	Increaser/decreaser

Ground vegetation: Stands dominated by pole or immature lodgepole with scattered ponderosa pine or white fir in overstory and/or understory. Shrub layer dominated by snowbrush and bitterbrush where seral to ponderosa pine/bitterbrush-snowbrush and snowbrush with manzanitas when seral to mixed conifer/snowbrush. Herbaceous species are needlegrass, squirreltail, Ross sedge, fireweed, prince-pine, strawberry; occasionally goosefoot violet and tail-cup lupine are present.

Revegetation: Shrub dominance prevents introduction of domestic grass species except along roadways. Suggest intermediate wheatgrass, orchardgrass, smooth brome-grass.

Silviculture: Moderate site productivity for lodgepole pine. Lodgepole pine successional to ponderosa pine and/or white fir as a result of conflagration fire. Favor later species in stand management through ponderosa pine plantations or selective thinnings. Dwarf mistletoe and western gall rust light to moderate. Gophers not evident.

Range management: Summer range for mule deer. Use on bitterbrush usually heavy due to its relative palatability with respect to other shrubs. Nonrange for livestock.

Indicators: Stocking and age class distribution of lodgepole with respect to other conifers indicates its seral status. Prevalence of snowbrush. This ecological unit not self-generating except under periodic fire occurrence.



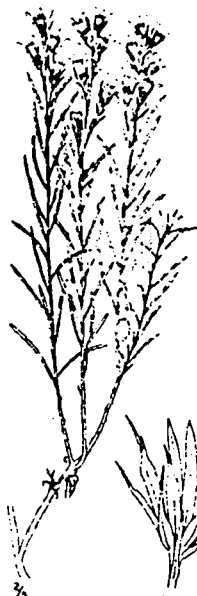
PRODUCTIVITY

(10 plots)

	SI (LP)	TBA	GBA10	ft. 3/yr Index
Mean	73	133	90	38
Std Error	3.8	11.9	11.8	7.4
5% CI	9	27	34	17



Pine Lupine



Transition-sh of Lupinus



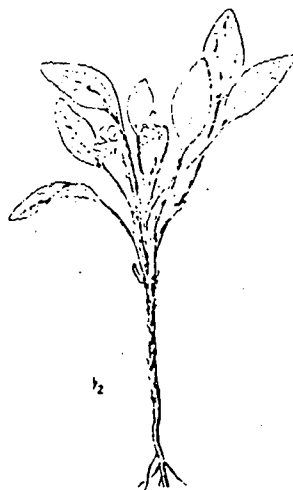
Salt fur or Lupinus (Lupinus)



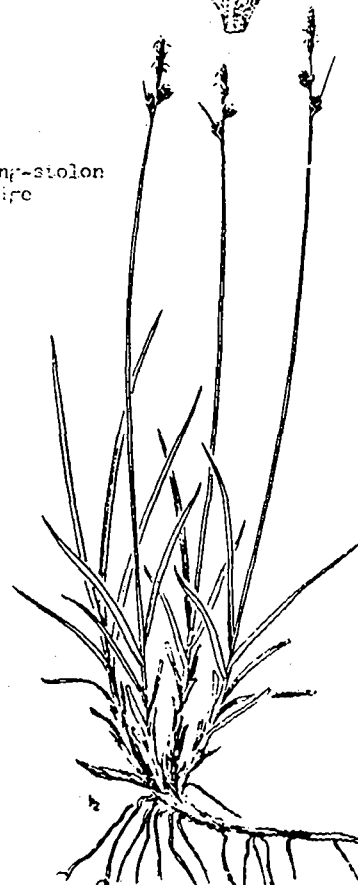
Long-stolon seife



Snow current



Rutell violet



LODGEPOLE PINE/SEDGE-LUPINE

CL-G4-11

ENVIRONMENT

Location: Deschutes, Winema NF
Slope position: lower to upper third
Aspect: east, south, southwest
Slope: 1-26%
Elevation: 5400-6500'
Topography: undulating to rolling
convex and concave; plateaus, basins,
terraces, escarpment heads.

SOILS

Geology: air-laid pumice, alluvium, scoria flow, welded
tuff
Surface texture: loamy sand to coarse sandy loam
Al+AC depth: 10-27"
Rooting depth: 25-50"
Buried soil depth: absent-45"
Total soil depth: > 48" (25)
Remarks: profile well drained and composed of
redeposited extrusive material. Particle size and
coarse fragment content widely varies depending on
parent material.

VEGETATION

Dominants	% Cover	Status
Lodgepole pine	25-60	Climax, with disturbance
Long-stolon sedge	2-12	Increaser
Western needlegrass	T-5	Increaser
Lupine (Anderson's or silvery)	1-20	Increaser

Ground vegetation: Cover of herbaceous vegetation
strongly affected by tree crown cover. Subalpine fir,
mountain hemlock, white pine or Shasta red fir may occur
as regeneration but subordinate to lodgepole pine.
Goldenweed and squaw currant as occasionals. Community
typically represented by western needlegrass, long-stolon
sedge, squirreltail, Anderson or silvery lupine, and
skeletonweed with princespine, sulfur buckwheat and
Nuttall violet occasional.

Revegetation: Long-stolon sedge prominent following soil
disturbance. Introduced species as hard fescue, orchard-
grass, and mountain brome seeded with marginal success.

Silviculture: Sites below 6000 feet have high site
productivity. Natural lodgepole regeneration common.
Establishment of planted stock requires site scarifica-
tion to remove sedge competition. Dwarfmistletoe and
western gall rust locally heavy. Preferred site for pocket
gophers. Expect lower site index and growth basal areas
at higher elevations.

Range management: Summer range for mule deer. Transi-
tory range for livestock following stand harvest and soil
disturbance.

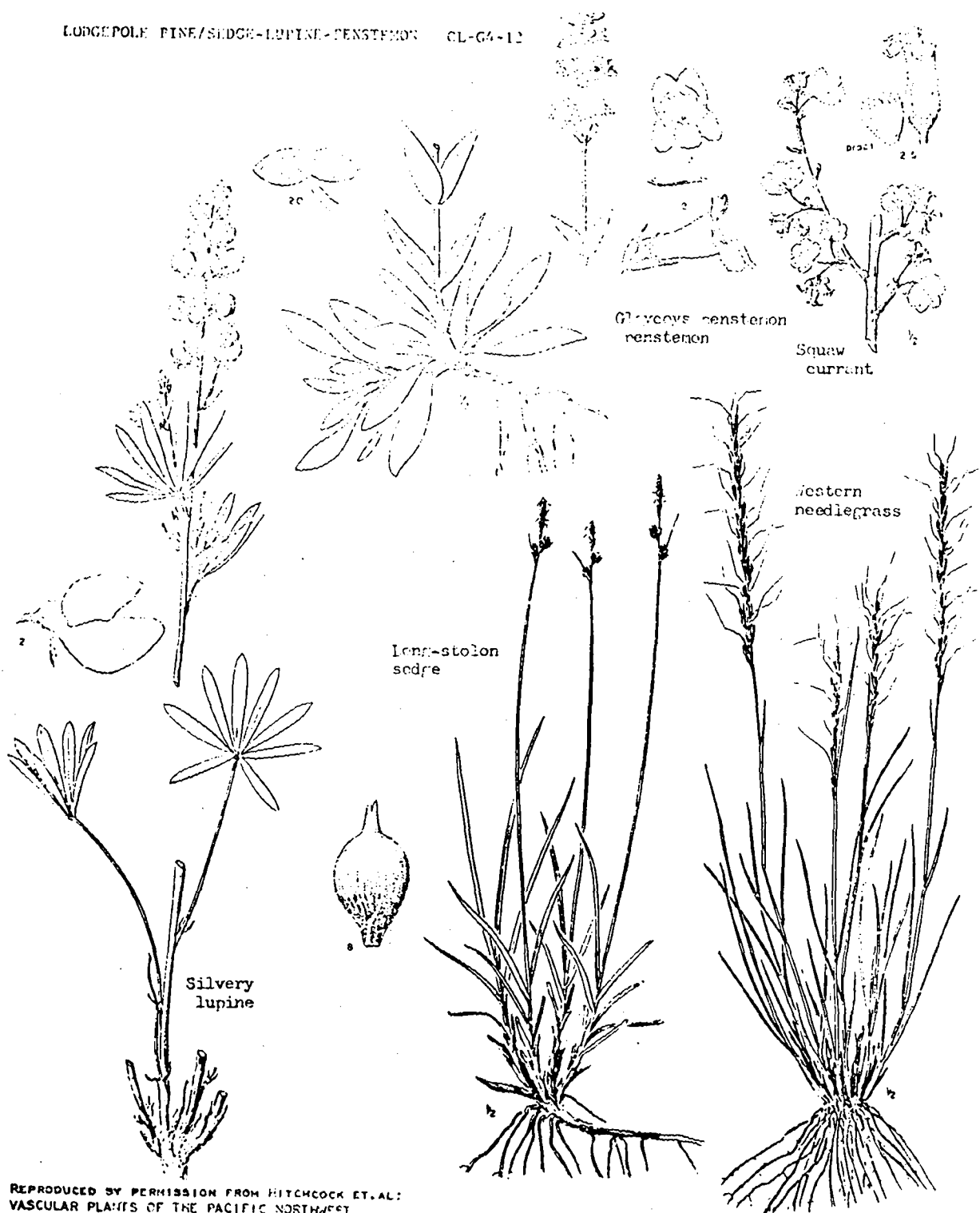
Indicators: Squaw currant, goldenweed, long-stolon sedge
and pocket gophers increase with clearcutting or burning.
Community typically dominated by sedge and lupine with
absence of Graycoys penstemon or linanthastrum.

PRODUCTIVITY

	(8 plots)				ft. 3/yr
	Forage	SI (LP)	TBA	GBA10	Index
Mean	137	81	196	151	74
Std Error	46	3.1	15.6	14.2	10.1
5% CI	118		33		25

data applicable to elevations 5400-6500'





LOGDGEPOLE PINE/SEDGE-LUPINE-PENSTEMON

CL-G4-12

ENVIRONMENT

Location: Deschutes NF
Slope position: lower to upper third
Aspect: all exposures (easterly)
Slope: 4-26%
Elevation: 5000-5800'
Topography: undulating to rolling
concave-flat-convex microrelief of
elevated plateaus, benches and
escarpment heads.

SOILS

Geology: air-laid pumice/glacial till, igneous colluvium
Surface texture: loamy coarse sand to loamy sand
Al+AC depth: 14-30"
Rooting depth: 27-36"
Buried soil depth: 14-32"
Total soil depth: 36-70"
Remarks: Surface horizons can be redeposited pumice
material. Pumice particle size less than 15mm
diameter. Cobbles restricted to buried soil.

VEGETATION

Dominants	% Cover	Status
Lodgepole pine	30-65	Seral or as fire climax
Western needlegrass	T-3	Increaser
Long-stolon sedge	T-10	Increaser, rhizomatous
Claycoys penstemon	3-20	Increaser, rhizomatous
Lupine (Anderson's or silvery)	0-20	

Ground vegetation: Ponderosa pine, white fir, mountain
hemlock or subalpine fir usually present as regeneration
or poles. Shrub layer weakly represented by rabbitbrush
goldenweed, squaw currant, princespine and/or greenleaf
manzanita. Squirreltail, Idaho fescue, and blue wildrye
occasionally associated with needlegrass and long-stolon
sedge. Forbs as skeletonweed, strawberry, Nuttall violet,
kelloggia, stickweed, Cascades aster are subordinate to
penstemon and lupine.

Revegetation: Use species adapted to mesic forest sites;
suggest smooth brome orchardgrass, hard fescue, timothy.

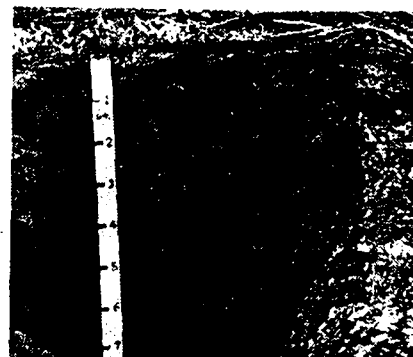
Silviculture: High site productivity. Natural regenera-
tion of lodgepole relatively easy to establish. Invasion
of lodgepole whenever soil scarification occurs in associ-
ation with logging. Mixed conifer stands can be expected
whenever another species is introduced. Dwarfmistletoe
moderate on lodgepole. Pocket gophers light to moderate.

Range management: Community has potential as transitory
range following logging and seeding of domestic species,
Marginal productivity under virgin conditions. Summer
range for mule deer.

Indicators: Increase in long-stolon sedge, penstemon,
needlegrass and squaw currant following burning or log-
ging. Expect increase in pocket gophers as herbaceous
productivity increases with disturbance.

PRODUCTIVITY

	SI (LP)	TBA	GBA10	ft. ³ /yr Index
Mean	83	213	170	78
Std Error	1.3	13.6	9.5	4.3
5% CI	3	35	24	11



LOGDGEPOLE PINE/SEDGE-LUPINE-PENSTEMON

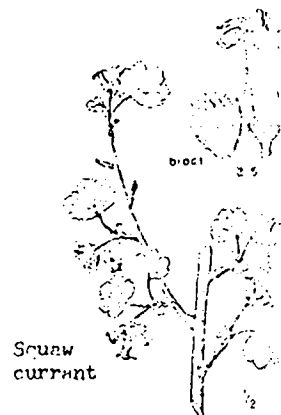
CL-G4-12



Tailcup
lupine



Greenes
goldenweed



Snow
currant



Ross sedge



Rabbitbrush goldenweed



Western
needlegrass

LODGEPOLE PINE/NEEDLEGRASS-LUPINE

CL-G3-14

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
Slope position: upper third
Aspect: all exposures
Slope: 1-25%
Elevation: 5900-8100'
Topography: flat to convex mountain
slopes and elevated basins

SOILS

Geology: air-laid pumice/cinders, lava flow,
rhyolitic pumice
Surface texture: loamy coarse sand to loamy fine sand
Al+AC depth: 6-14"
Rooting depth: 17-45"
Buried soil depth: 16-45"
Total soil depth: 50"+
Remarks: pumice particle size 10-15mm diameter; up to
90% coarse fragments by volume for C horizon. Some
redeposition of surface horizon material evident.
Buried soils gravelly but not cobbly.

VEGETATION

<u>Dominants</u>	<u>% Cover</u>	<u>Status</u>
Lodgepole pine	10-40	Climax
Western needlegrass	2-20	Increaser
Ross sedge	1-20	Increaser
Tailcup lupine	3-20	

Ground vegetation: Higher elevations have mountain hemlock and/or western white pine as scattered regeneration. Shrub layer absent in many stands, being weakly represented by squaw currant, rabbitbrush goldenweed at lower elevations or Greenes goldenweed on elevated exposures. Linanthastrum is absent. Needlegrass, squirreltail and Ross sedge common. Long-stolon sedge absent. Tailcup lupine clearly dominant of forb layer. Species of minor importance are western yarrow, strawberry, least lupine, pussytoes, and smallflower penstemon.

Revegetation: Very harsh sites climatically. Do not attempt revegetation.

Silviculture: Moderately low productivity depending upon elevation. Upper elevations may be noncommercial. Natural or planted stock difficult to establish due to frost heaving, pocket gophers, and xeric soil profiles. Manage for lodgepole pine. Dwarfmistletoe and western gall rust severe in some areas.

Range management: Nonrange for livestock due to inaccessibility and low forage production. Summer range for mule deer.

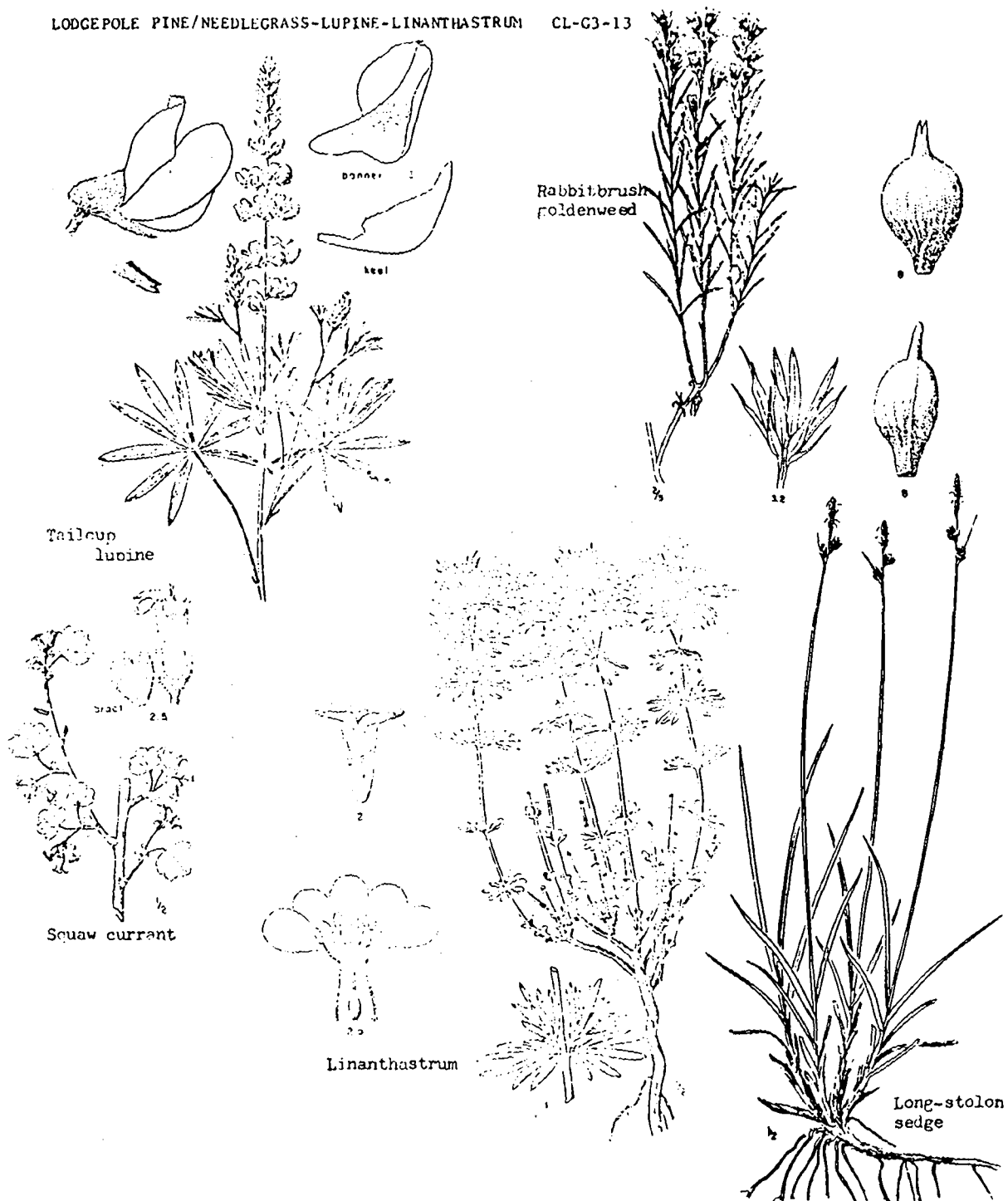
Indicators: Stands characterized by absence of shrubs and codominance of needlegrass with tailcup lupine. Exposed convex slopes at high altitudes have prominence of bareground, erosion pavement and pocket gopher activity. This community is of greatest value for water production during early summer.



PRODUCTIVITY

(7 plots)

	SI (LP)	TBA	GBA10	ft. ³ /yr Index
Mean	70	130	87	35
Std Error	4.8	7.3	10.2	4.6
5% CI	12	17	25	12



LOGEPOLE PINE/NEEDLEGRASS-LUPINE-LINANTHASTRUM CL-G3-13

ENVIRONMENT

Location: Deschutes, Fremont NF
Slope position: mid to upper third
Aspect: all exposures (southerly)
Slope: 0-30%
Elevation: 5600-7100'
Topography: convex to concave;
basins, buttes, mountain sideslopes.

SOILS

Geology: air-laid pumice/lava flow or colluvium
Surface texture: loamy coarse sand to loamy sand
Al+AC depth: 10-25"
Rooting depth: 30-56"
Buried soil depth: 28-58"
Total soil depth: 40-75"
Remarks: Pumice reworked. Particle size < 17mm diameter.
Coarse fragments < 35% by volume. Pumice discontinuous
over buried soil.

VEGETATION

Dominants	% Cover	Status
Lodgepole pine	10-35	Climax
Squaw currant	0-7.5	Increaser
Western needlegrass	3-20	Increaser
Long-stolon sedge	0-20	Increaser, rhizomatous
Tailcup lupine	3-20	Forb indicator
Linanthastrum	3-20	Half-shrub indicator

Ground vegetation: Ponderosa pine, white fir or mountain hemlock as occasional seedling or sapling. Whitebark pine present at high elevations. Currant subordinate to linanthastrum. Bitterbrush rare to absent. Long-stolon sedge may be absent from stands lacking reworked pumice soils; Ross sedge occurs instead. Needlegrass and squirreltail always present. Common forbs are strawberry, skeletonweed, least lupine, and smallflower penstemon.

Revegetation: Disturbed sites are readily dominated by sedge; use hard fescue, intermediate wheat or mountain brome.

Silviculture: Moderate site productivity. Any harvest method will encourage lodgepole dominance. Planting will require scarification below rhizomes of sedge. Community highly preferred by gophers. Dwarf mistletoe and western gall rust common on lodgepole. Mountain pine beetle very active.

Range management: Satisfactory forage supply for livestock, especially as transitory range following timber harvest. Summer use by mule deer.

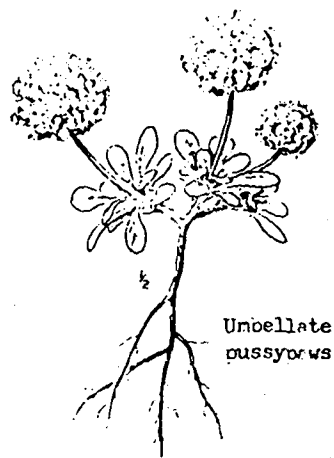
Indicators: Increase in long-stolon sedge, goldenweed, squirreltail following burning or soil disturbance. Natural seedling establishment hindered by sedge competition and pocket gophers. Expect gophers to increase following stand harvest.

PRODUCTIVITY

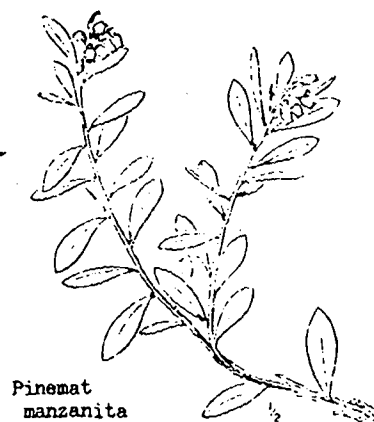
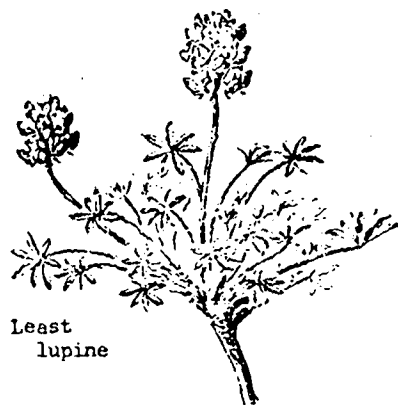
	(7 plots)				
	Forage	SI (LP)	TBA	GBA10	ft. ³ /yr Index
Mean	73	75	159	104	43
Std Error	27.7	3.9	17.7	8.9	4.4
5% CI	*	10	43	22	11

* Data too variable for CI





Greenleaf
manzanita



LODGEPOLE PINE/MANZANITA CL-S3-11

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
Slope position: mid to upper third
Aspect: east, south, west
Slope: 2-30%
Elevation: 5800-7000'
Topography: convex to concave, mountain sideslopes, ridges escarpments.

SOILS

Geology: air-laid pumice, pumice alluvium/lava colluvium
Surface texture: loamy coarse sand
Al+AC depth: 6-14"
Rooting depth: 20-30"
Buried soil depth: absent-30"
Total soil depth: 40" +
Remarks: well-drained, coarse-textured, poorly developed soils. Hydrophobic surface horizon can be present at higher elevations.

VEGETATION

Dominants	% Cover	Status
Lodgepole pine	15-50	Climax/seral
Pinemat manzanita	T-30	Increaser
Greenleaf manzanita	0-40	Increaser
Western needlegrass	< 3	Increaser

Ground vegetation: Shasta red fir, white pine or white fir regeneration may be present depending on slope position. Lodgepole replaces itself after burning or logging; is climax on flatter slopes and successional with change in slope position and steepness. Squaw currant or goldenweed can be present. Common understory plants are needlegrass, squirreltail and Ross sedge with skeletonweed, least lupine, smallflower penstemon, fireweed and pussy-paws. Upper limit for bitterbrush.

Revegetation: Not recommended.

Silviculture: Very low site productivity. Noncommercial in many areas or at best marginal due to slow growth and difficulty to regenerate. Fremont samples tend to have lower total and growth basal areas than Deschutes-Winema plots. Manage for lodgepole where it dominates. Gophers absent. Windthrow, dwarfmistletoe and stem breakage common. Refrain from slash burning where hydrophobic soils present.

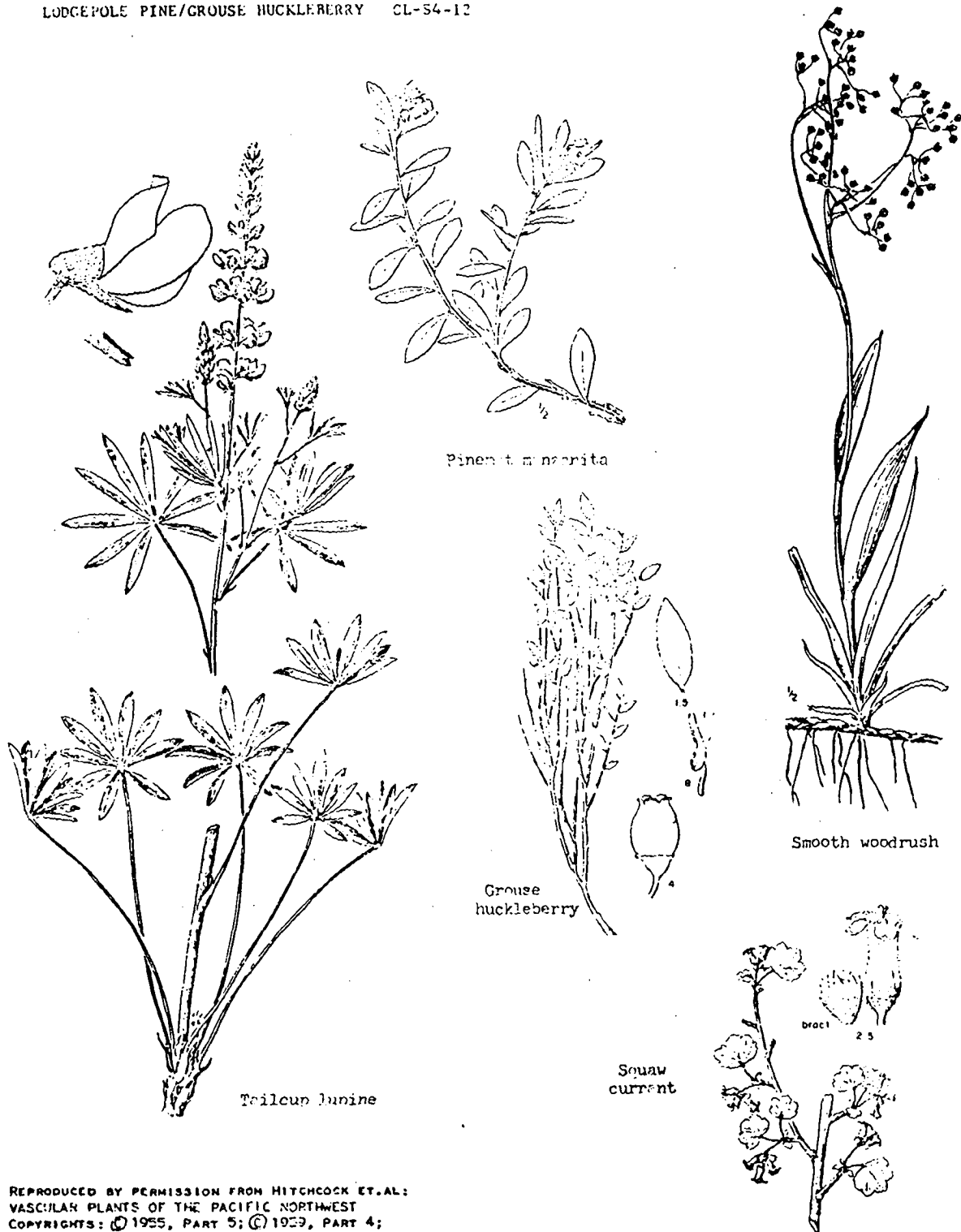
Range management: Nonrange for livestock. Mule deer summer range but not a preferred habitat.

Indicators: Increase in manzanitas after soil disturbance or burning. Frost heaving and colluvial movement of pumice apparent on many sites.



PRODUCTIVITY (12 plots)

	SI (LP)	TBA	GBA10	ft. 3/yr Index
Mean	51	109	46	14
Std Error	1.8	10.8	3.9	1.5
5% CI	4	24	9	3



LOGEPOLE PINE/GROUSE HUCKLEBERRY CL-S4-12

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
Slope position: lower to mid third
Aspect: all exposures
Slope: 5-45%
Elevation: 5100-6400'
Topography: flat to convex; escarpments, ridges, basins

SOILS

Geology: air-laid pumice, pumice colluvium/pumice, lava
Surface texture: loamy coarse sand to fine sandy loam
Al+AC depth: 5-28"
Rooting depth: 25-40"
Buried soil depth: 18-40"
Total soil depth: 35"+
Remarks: well-drained, cold profiles. A2 horizon can be present. Compacted litter layer. Pumice particle size usually < 25mm.

VEGETATION

Dominants	% Cover	Status
Lodgepole pine	20-30	Climax to seral
Grouse huckleberry	1-30	Indicator, status unknown
Squaw currant	< 5	Increase

Ground vegetation: Mountain hemlock usually present as regeneration. Stand reverts to lodgepole after burning or logging. Lodgepole successional to hemlock with protection except at lower positions and flatter slopes where pine is climax. Squaw or sticky currant present but subordinate. Pinemat manzanita occasional on rocky outcrops and shallow soils. Pinegrass or smooth woodrush may occur northerly in the pumice deposit. Western needlegrass, squirreltail, tailcup lupine, strawberry and yarrow usually present but not prominent.

Revegetation: Difficult because of severe microclimates and poorly-developed soils. Suggest trials of orchardgrass, alpine timothy and hard fescue.

Silviculture: Moderate site productivity. Natural regeneration lacking. Planting any species but lodgepole pine is tenuous. Planting success marginal due to cold, short growing seasons and shallow AC horizons. Pocket gophers absent. Dwarfmistletoe very occasional. Western gall rust common. Snow breakage common.

Range management: Nonrange for livestock due to low forage production. Summer range for mule deer.

Indicators: Presence of grouse huckleberry and depauperate herbaceous layer. Decrease in huckleberry with increase in tree crown cover.



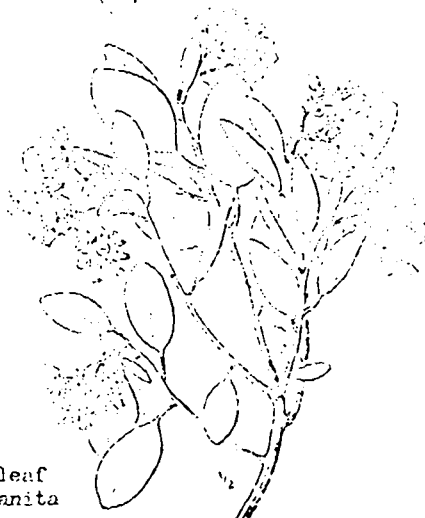
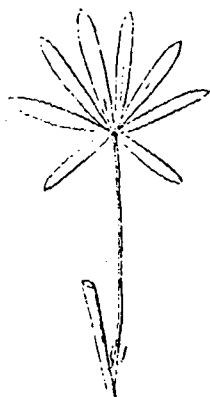
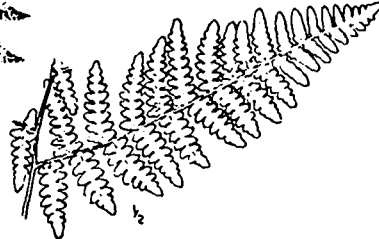
PRODUCTIVITY (5 plots)				
	SI (LP)	TSA	GBA10	ft. 3/yr Index
Mean	75	161	103	46
Std Error	6.3	11.1	11.9	7.8
5% CI	17	31	38	25



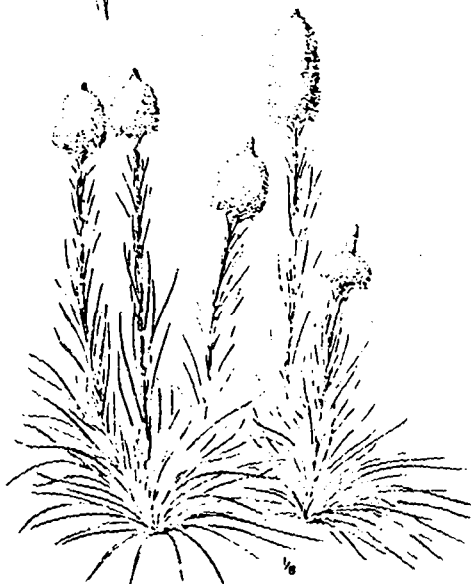
Silvery
lupine



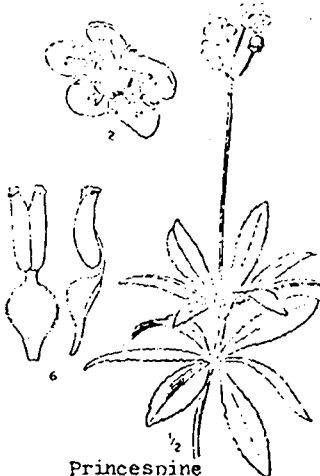
Breckenfern



Greenleaf
manzanita



Beargrass



Princespine



Long-
stolon
sedge

LODGEPOLE PINE/BEARGRASS

CL-M4-11

ENVIRONMENT

Location: Deschutes NF
Slope position: lower to upper third
Aspect: all exposures
Slope: 5-40%
Elevation: 4800-5500
Topography: undulating microridge/
swale; broad basins, mountain
slopes and ridges.

SOILS

Geology: volcanic or pumice ash/glacial till
Surface texture: loamy sand to fine sandy loam
Al+AC depth: 10-20"
Rooting depth: 36-50"
Buried soil depth: unknown
Total soil depth: unknown
Remarks: Nash Crater ash or pumice ash lies
discontinuous over buried soil.

VEGETATION

Dominants	% Cover	Status
Lodgepole pine	15-50	Seral, maintained by fire
Mountain hemlock	T-30	Major climax
Subalpine fir	5-30	Minor climax
Beargrass	15-60	Dominant
Long-stolon sedge	T-5	Rhizomatous increaser
Silvery lupine	T-20	Increaser

Ground vegetation: Hemlock, true firs and white pine usually occur as regeneration under a lodgepole overstory. Ponderosa pine is an occasional. Pinemat or greenleaf manzanita, snowberry, princespine, baldhip rose can be present but not dominant. Common forbs are white hawkweed, Graycoys penstemon, strawberry, and pyrola. Brackenfern, pinegrass, sweetanise and solomon-plume can be present.

Revegetation: Long-stolon sedge is prominent following soil disturbance. Hard fescue and orchardgrass can be introduced.

Silviculture: High site productivity for lodgepole. Lodgepole successional to hemlock and subalpine fir and will dominate the stand for one rotation after logging or burning. Use shelterwood system to encourage tolerant species. Pocket gophers common. Bark beetles and western gall rust locally common.

Range management: Nonrange for livestock. Summer range for mule deer.

Indicators: Expect increase in long-stolon sedge, brackenfern, and silvery lupine with soil disturbance. Greenleaf manzanita may increase slightly.

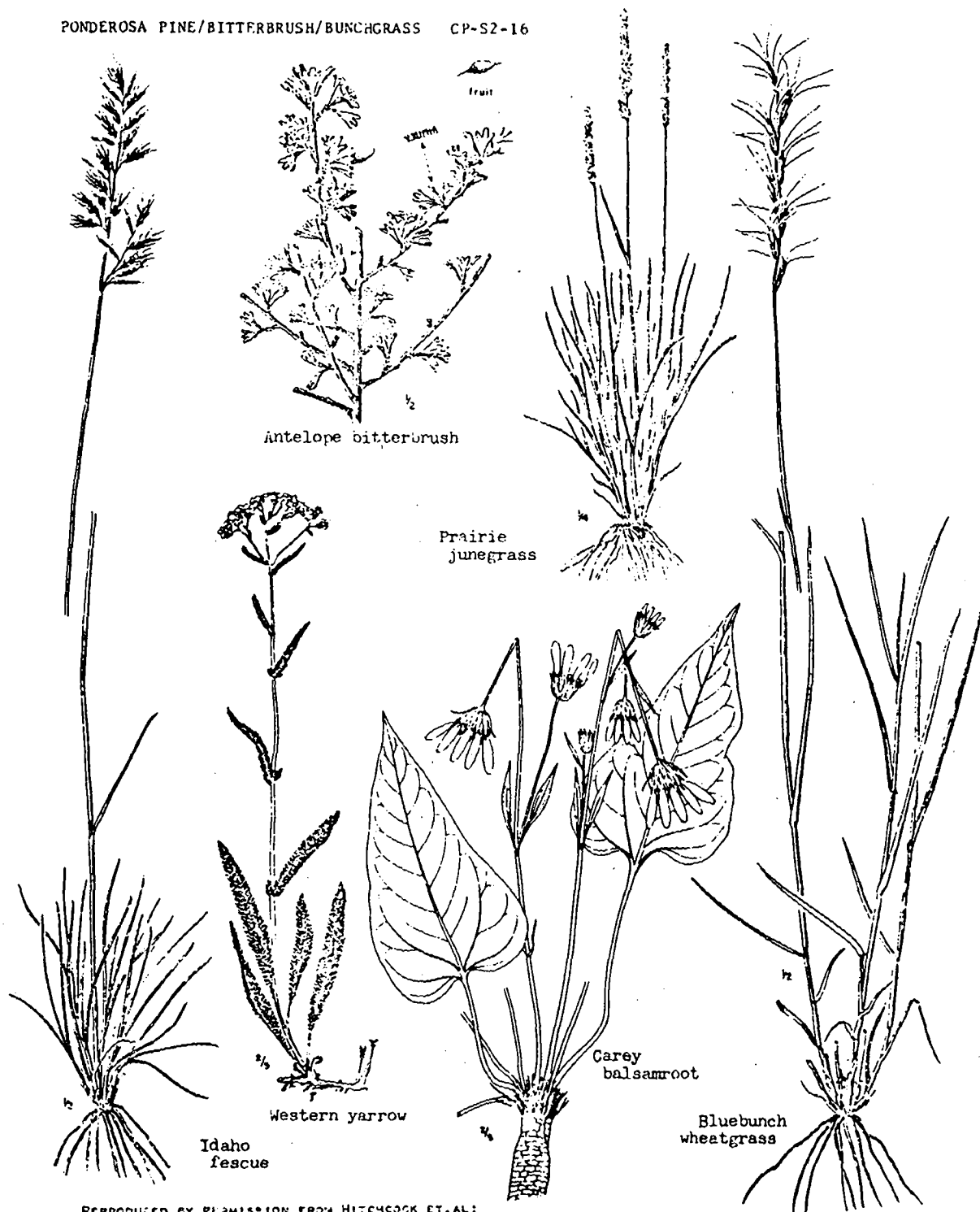


PRODUCTIVITY	(3 plots)			ft. ³ /yr Index
	SI (LP)	TBA	GBA10	
Mean	93	180	160	82
Std Error	.5	17.3	10.8	5.7
5% CI	3	*	47	*

*data too variable for 5% CI

LODGEPOLE PINE/BEARGRASS

CL-M4-11



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PONDEROSA PINE/BITTERBRUSH/BUNCHGRASS

CP-S2-16

ENVIRONMENT

Location: Deschutes, Fremont NF
Slope position: lower to upper third
Aspect: all aspects (southerly)
Slope: 5-40%
Elevation: 2900-5400'
Topography: steep to undulating.
Butte and escarpment slopes of lava plateaus.

SOILS

Geology: shallow pumice/basalt. andesite, tuff
Surface texture: gravelly loamy sand to fine sandy loam
Al+AC depth: 7-25"
Rooting depth: 25-35" (55)
Buried soil depth: 4-25"
Total soil depth: 25-40" (60)
Remarks: pumice to 5mm diameter, usually mixed or as colluvium. Coarse pumice absent. Trees and shrubs root in buried soil.

VEGETATION

<u>Dominants</u>	<u>% Cover</u>	<u>Status</u>
Ponderosa pine	5-40	Climax
Bitterbrush	1-20	Decreaser
Bluebunch wheatgrass	1-10	Decreaser
Idaho fescue	1-20	Decreaser, low palatability.

Ground vegetation: Noticeable absence of big sagebrush. Sandberg bluegrass and squirreltail subordinate.

Prairie junegrass occasional. Cheatgrass common with overgrazing or soil displacement. Western yarrow, Carey or arrowleaf, balsamroot, nineleaf lomatium, tailcup lupine, and western gromwell usually present.

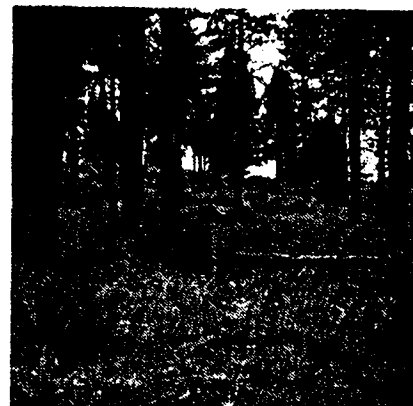
Revegetation: Prevent destruction of bitterbrush. Steep slopes may be too stoney for treatment. Use domestic wheatgrasses if reseeded.

Silviculture: Moderately low site productivity. Natural regeneration difficult; steeper slopes of low-elevation canyons may be marginal for this reason. Dwarfmistletoe is common.

Range Management: Spring-fall range for mule deer.

Suitability for livestock depends upon slope steepness and access to water. Invasion of western juniper with fire protection. Recent burns have little or no bitterbrush.

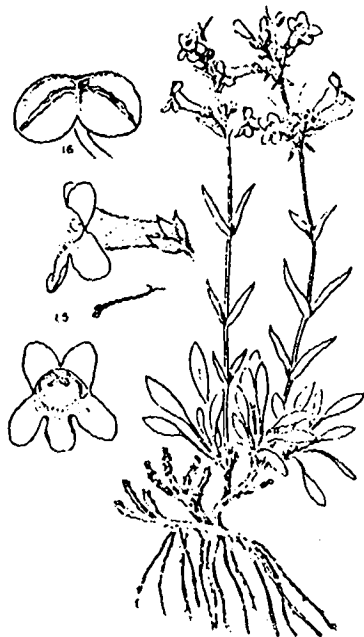
Indicators: Bluebunch wheatgrass most prevalent on steep slopes and stony soils; suggests dry site. Presence of Douglas-fir suggests more mesic environment. Flatter slopes dominated by Idaho fescue.



PRODUCTIVITY

(8 plots)

	Forage	SI (PP)	TBA	GBA10	ft. 3/yr Index
Mean	194	72	74	69	28
Std Error	35.4	2.7	8.4	9.8	4.7
5% CI	84	6	20	23	11



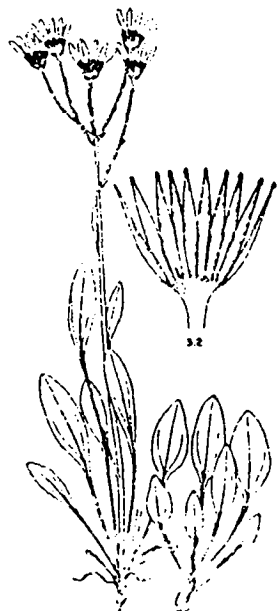
Low penstemon



Antelope bitterbrush



Bottlebrush squirreltail



Woolly groundsel



Rabbitbrush goldenweed



Snow currant

PONDEROSA PINE/BITTERBRUSH/SQUIRRELTAIL (RHYOLITE)

CP-S2-18

ENVIRONMENT

Location: Ft Rock RD., Deschutes NF
Slope position: lower to mid third
Aspect: all exposures
Slope: 4-25%
Elevation: 4850-5100'
Topography: convex to ridge/swale
slopes of escarpment, plateaus,
recent basalt flows.

SOIL

Geology: Newberry rhyolite pumice/Mazama pumice/basalt
flow or colluvium
Surface texture: coarse sand to loamy sand
Al+AC depth: 8-10"
Rooting depth: 50-70"
Buried soil depth: 12-34"
Total soil depth: > 60"
Remarks: well-drained profiles. Rhyolite pumice lies
discontinuous over Mazama dacite pumice.

VEGETATION

Dominants	% Cover	Status
Ponderosa pine	5-50	Climax
Lodgepole pine	0-10	Seral/climax in swales
Bitterbrush	T-30	Decreaser
Squirreltail	1-5	Increaser

Ground vegetation: In hummocky topography lodgepole
dominates in swales while ponderosa prominent on micro-
ridges. Squaw currant and goldenweed subordinate.
Herbaceous species include Ross sedge, needlegrass,
rockcress, woolly groundsel and low penstemon. Shrubs
may be absent from flat ground with dense tree canopy.

Revegetation: Not recommended on these coarse pumice
soils.

Silviculture: Moderate site productivity. Lodgepole
pine is aggressive invader following logging and
scarification. Maintenance of ponderosa pine requires
planting but survival is doubtful. Dwarf mistletoe
common on lodgepole but absent from ponderosa pine.

Range Management: Mule deer habitat in early spring and
late fall. Bitterbrush heavily browsed and decadent.
Herbage production too low to support livestock grazing.

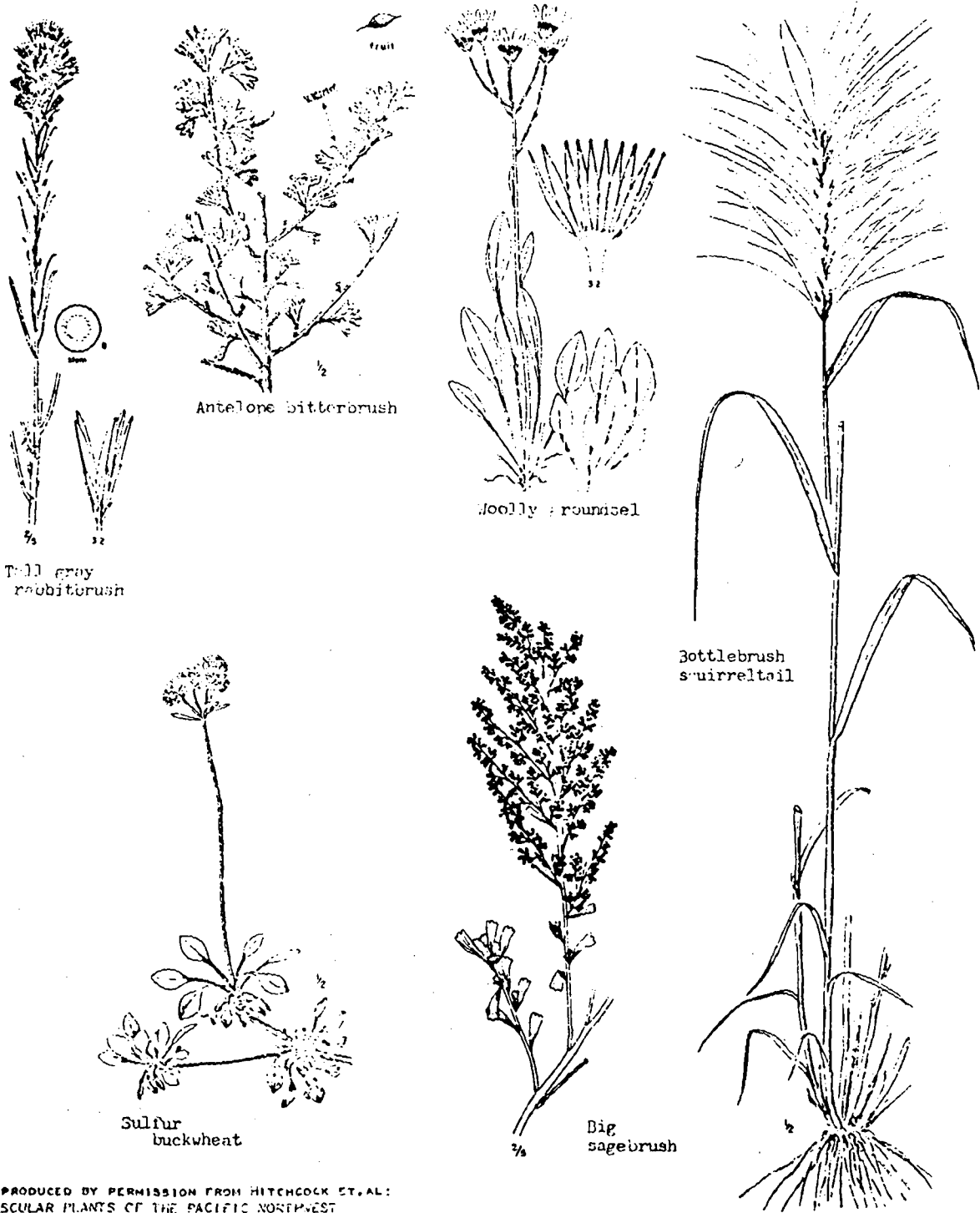
Indicators: Increase in currant, goldenweed, squirrel-
tail and needlegrass with site disturbance.



PRODUCTIVITY

(3 plots)

	SI (PP)	TBA	GBA10	ft. ³ /yr Index
Mean	74	113	91	38
Std Error	4	33	25.8	12.4
Range	66-80	60-175	42-129	15-57



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PONDEROSA PINE/BITTERBRUSH-SAGEBRUSH/SQUIRRELTAIL (RHYOLITE)

CP-S1-12

ENVIRONMENT

Location: Ft Rock RD, Deschutes NF
Slope position: mid third
Aspect: all exposures
Slope: 0-6%
Elevation: 4800-5100'
Topography: undulating microridge/
swale of plateaus

SOILS

Geology: Newberry rhyolite pumice/Mazama pumice/lava,
cinders
Surface texture: sand to loamy sand
Al+AC depth: 4-12"
Rooting depth: 25-36" (65" for trees)
Buried soil depth: 12-20"
Total soil depth: 25-70"
Remarks: well drained profile. Newberry C horizon.
gravels to 45mm. Coarse fragment content 90% by
volume.

VEGETATION

Dominants	% Cover	Status
Ponderosa pine	5-15	Climax
Bitterbrush	5-20	Decreaser
Big sagebrush	2-35	Increaser
Squirreltail	1-10	Increaser
Ross sedge	< 5	Increaser

Ground vegetation: Represents the ponderosa pine savanna within the Newberry pumice zone. Relative composition between sagebrush and bitterbrush depends upon grazing use in past. Gray rabbitbrush, squaw currant, sulfur buckwheat and graminetilia subordinate. Idaho fescue occasionally present. Other herbaceous plants are needlegrass, yarrow, rockcress, woolly grousel, Brewer monkeyflower.

Revegetation: Maintain a sagebrush and bitterbrush complement for deer browse. Seeding domestic grasses or sagebrush spraying not recommended.

Silviculture: Low site productivity. Natural and artificial regeneration should be hard to establish. Seed years and favorable growing conditions occur infrequently. Dwarf mistletoe not present. Windthrow moderate.

Range Management: Prime deer habitat in late fall-winter and early spring. Bitterbrush and currant heavily hedged. Manage livestock to minimize grazing pressure on shrubs.

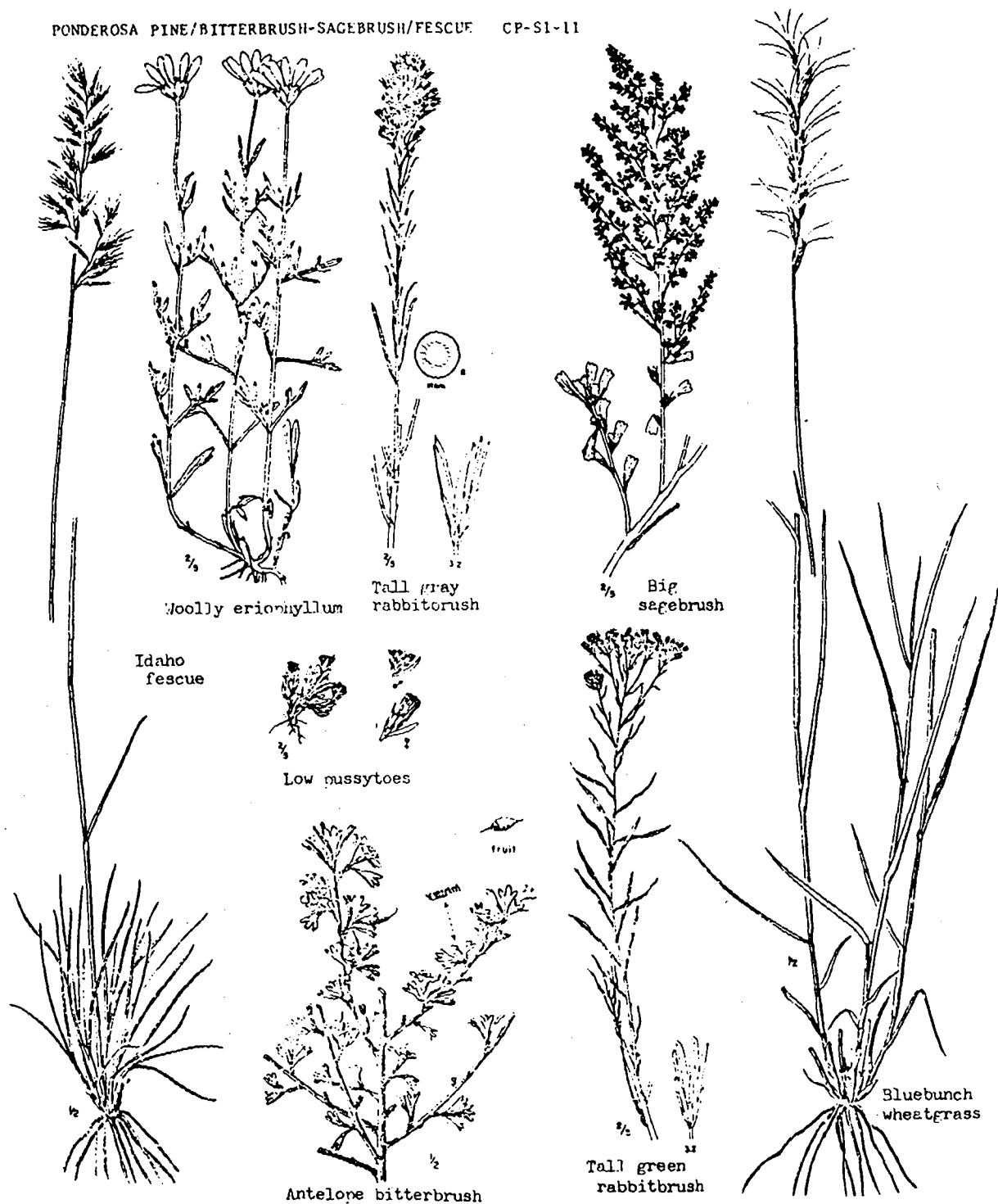
Indicators: Sagebrush in association with bitterbrush. Low ponderosa pine basal area. Coarse pumice gravels on soil surface. Rabbitbrush and squirreltail increase with disturbance as logging, burning or spraying for sagebrush.

PRODUCTIVITY

	(4 plots)				ft. ³ /yr
	Forage	SI (PP)	TBA	GBA10	Index
Mean	31	69	50	45	17
Std Error			5.8		
Range	*	*	40-80	*	*

* 1 plot sample





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PONDEROSA PINE/BITTERBRUSH-SAGEBRUSH/FESCUE CPS1-11

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
Slope position: bottom to upper third
Aspect: west, south, east
Slope: 1-55%
Elevation: 4300-6100 ft.
Topography: flat to convex; undulating
to steep slopes of mountain ridges,
buttes, basalt plateaus, upland flats.

SOILS

Geology: pumice over basalt flow, colluvium, glacial
outwash, welded tuff or diatomaceous lake sediments.
Surface texture: coarse sandy loam to loams
Al+AC depth: 13-25"
Rooting depth: 10-60"
Buried soil depth: 10-40" (60")
Stone content: 10-50%
Soil classification:
Remarks: pumice highly mixed with buried soil. Coarse
pumice lacking. Steep slopes have stoney profiles
from colluvium. Southern Winema stands with
saturated soils in spring.

VEGETATION

Dominants	% Cover	Constancy	Status
Ponderosa pine	3-30	100	Climax
Western juniper	1-30	64	Increaser
Mountain mahogany	10-50	50	Decreaser
Bitterbrush	1-30	100	Decreaser/increaser
Big sagebrush	1-20(50)	100	Increaser
Idaho fescue	1-30	100	Decreaser
Bluebunch wheatgrass	0-9	28	Decreaser

Ground Vegetation: Green and grey rabbitbrush present depending upon past grazing and fire history. Prairie junegrass as weak subordinate. Bluebunch wheatgrass common on slopes exceeding 20%. Western yarrow, rose pussytoes, perennial flax and wooly eriophyllum common. South Chiloquin sites commonly have more juniper and some infusion of low sagebrush compared to stands occurring further north.

Revegetation: Domestic species restricted to crested, intermediate or pubescent wheatgrass. Very shallow, rocky soils or steep slopes limit equipment. Cheatgrass and/or rabbitbrush may increase on reseeded areas.

Silviculture: Very low site productivity. A forest site producing less than 20ft³/A/yr will generally exhibit (1) a basal area less than 50 sq. ft./acre, (2) a soil depth less than 20 inches and (3) a large component of western juniper in association with ponderosa pine. Natural regeneration is difficult to establish, good seed years are very infrequent. Site scarification for control of sagebrush and fescue necessary for planting. Dwarf mistletoe not present.

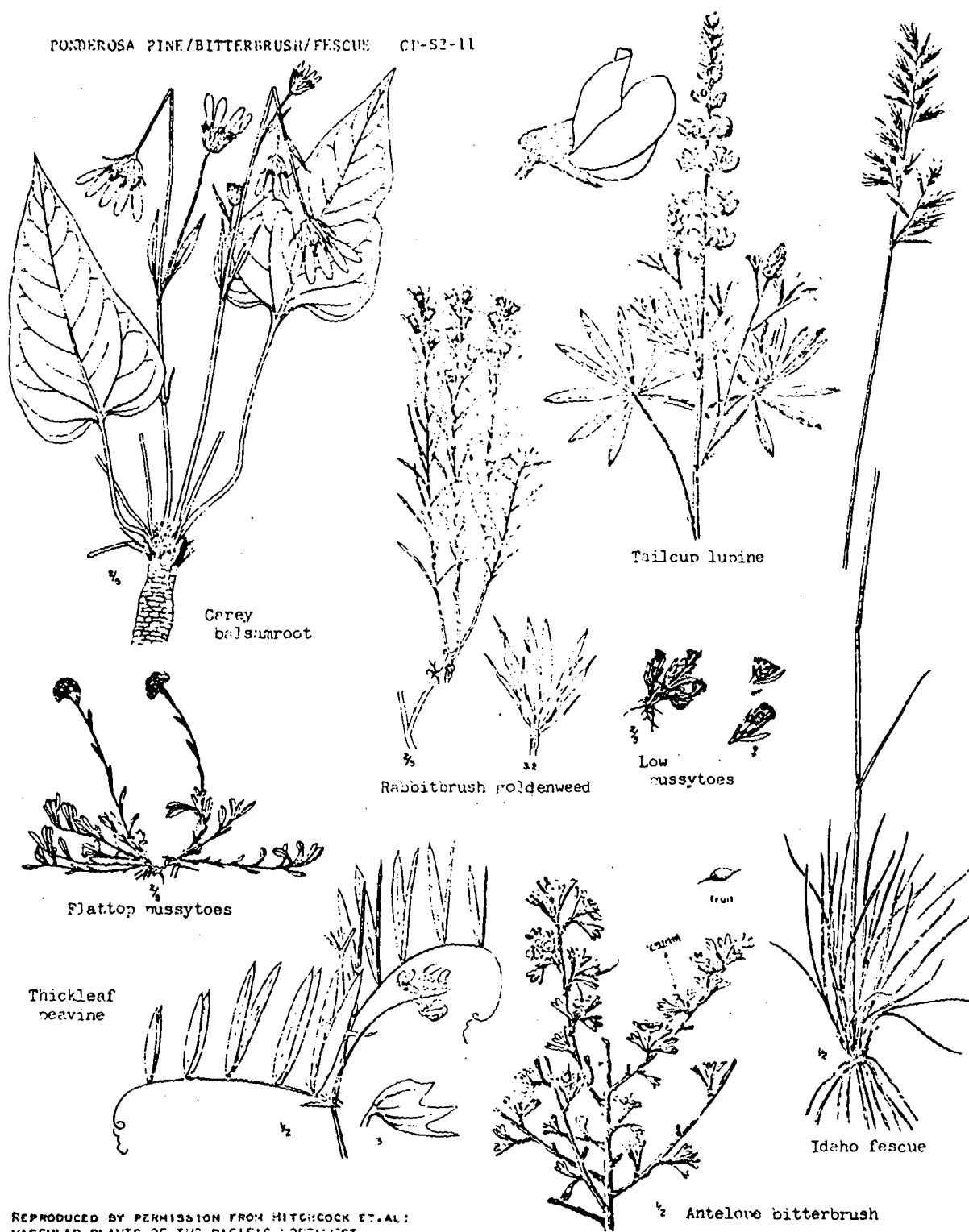
Range and Wildlife Mgt.: Excellent potential as livestock range if provide water. Spring-fall-winter range for mule deer and antelope. Represents the pine savanna on periphery of shrub steppe. Niche diversity very high for bird species.

Indicators: Rabbitbrush increases with overgrazing or underburning. Juniper and big sagebrush increase with overgrazing and fire protection. Idaho fescue dominates on gentle undulating slopes. Wheatgrass and/or mountain mahogany suggests shallow, stony soils. Low sagebrush without a ponderosa pine overstory indicates a distinct non-forest community.

PRODUCTIVITY

	Forage	SI (PP)	TBA	GBA10	ft. ³ /yr Index
Mean	217	65	73	75	26
Std Error	25.3	3.9	10.2	10.0	3.3
5% CI	65	10	26	20	6
No. Plots	6	6	6	6	6





PONDEROSA PINE/BITTERBRUSH/FESCUE

CPS2-11

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
Slope position: mid third to bottom
Aspect: all exposures
Elevation: 2550-5600 ft.
Topography: flat, concave, convex;
terraces, outwash plains, plateaus,
toeslopes, escarpments, ridges.

SOILS

Geology: air-laid or flow pumice over lava, alluvium
or sedimentary.
Surface texture: loams, loamy coarse sand to sandy
clay loam
Alt+AC depth: 9-28 inches
Rooting depth: 15-60 inches
Buried soil depth: 6-28 inches
Stone content: 2-60%
Soil classification:
Remarks: profile well mixed and generally lacking C1
horizon. Moist but without water table by mid June.
AC horizon pumice < 35mm diameter and 40% coarse
fragments by volume.

VEGETATION

Dominants	% Cover	Constancy	Status
Ponderosa pine	5-60	100	Major climax
Western juniper	0-10	40	Minor climax
Mountain-mahogany	0-10	30	Decreaser
Bitterbrush	7-50	95	Decreaser/increaser
Idaho fescue	1-40	100	Decreaser/increaser
Squirreltail	0-5	88	Increaser

Ground Vegetation: Lodgepole subordinate. Juniper and
mahogany occur where pumice soils are shallow. Goldenweed
and squaw currant subordinate with minimum disturbance.
Common herbs are squirreltail, needlegrass, pussypaws,
tailcup lupine, strawberry. Sisters area has low
penstemon, Carey balsamroot, flax, Scouler hawkweed,
peavine, and clarkia. Western larch occurs in Metolius
area. Junegrass and Sandberg bluegrass occur along desert
fringe. Wheeler bluegrass common on Pine Mt. with
bitterbrush absent. Southern Fremont stands have Wheeler
bluegrass, long-stolon sedge, bittercherry, squawcarpet
and wooly wyethia.

Revegetation: Grass seeding with crested, intermediate or
pubescent wheatgrass, hard fescue, mountain brome or
Russian wildrye gives fair to good success in pumice but
not outwash-derived soils. Bitterbrush necessary as
livestock or deer forage.

Silviculture: Moderate site productivity. Northern
Deschutes stands with greater stocking level than Winema
or Fremont NF - transition is 50-60 airline miles from
Crater Lake. Site index not different geographically.
Natural regeneration common under shelterwoods but
difficult to establish without overstory protection.
Planting requires scarification of fescue. Moist soils in
spring and early summer increase compaction hazard.
Gophers rarely present. Dwarfmistletoe, Elytroderma
needle cast or commandra rust common.

Range Management: Must force livestock onto fescue to
achieve allowable use. Community usually requires water
hauling. Underburning reduces shrub component
considerably, increases herbaceous production three to
eight times.

Indicators: Bitterbrush scarce where soils saturated in
spring. Goldenweed and fescue increase with skidding or
burning. Mahogany and juniper occur on shallow, well-
drained soils.

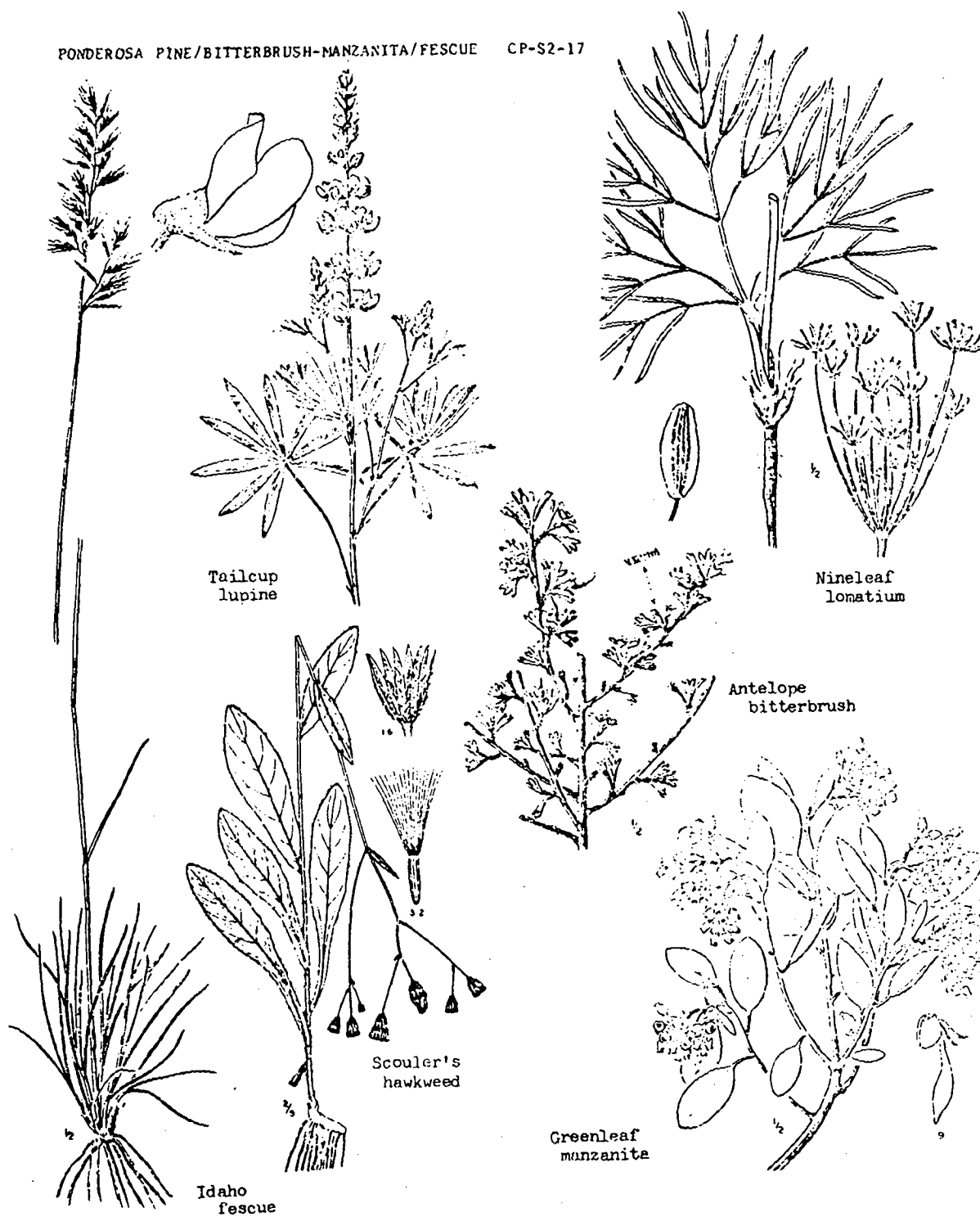
PRODUCTIVITY

	Forage	SI (PP)	TBA	GBA10	ft. ³ /yr Index
Mean	121	76	142	98	41
Std Error	9.4	1.0	5.8	4.1	2.0
5% CI	19	2	11	8	4
No. Plots	43	69	68	67	67



PONDEROSA PINE/BITTERBRUSH/FESCUE

CPS2-11



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ENVIRONMENT

Location: Deschutes, Fremont
Slope position: lower to upper third
Aspect: all exposures
Slope: 2-30%
Elevation: 3100-6000 ft.
Topography: convex to flat; undulating to steep slopes of outwash plains, plateaus, terraces, buttes, cones

SOILS

Geology: well mixed pumice over basalt, andesite, glacial outwash, welded tuff.
Surface texture: coarse to fine sandy loam
Al+AC depth: 10-24"
Rooting depth: 18-45"
Buried soil depth: 10-24"
Total soil depth: 24-60"
Stone content: 2-50(75)
Soil classification:
Remarks: pumice to 15mm dia. highly mixed with buried soil. Igneous gravels common within pumice overburden. Coarse pumice lacking.

VEGETATION

Dominants	% Cover	Constancy	Status
Ponderosa pine	7-40	100	Climax
Western juniper	0-5	66	Increaser
Mountain-mahogany	0-20	40	Increaser
Bitterbrush	3-43	100	Decreaser
Greenleaf manzanita	2-25(40)	100	Increaser
Squawcarpet	0-30	30	Increaser
Idaho fescue	3-23(50)	100	Decreaser, low palatability
Western needlegrass	0-5	85	Palatable increaser
Squirreltail	1-10(40)	96	Palatable increaser
Ross sedge	0-5(10)	85	Palatable increaser

Ground Vegetation: Shrub layer dominated by bitterbrush and manzanita. Snowbrush subordinate, if present. Southern Fremont stands have squawcarpet and gray rabbitbrush on loam to clay loam soils some with white fir understory. Fire protection gives juniper or mountain mahogany invasion adjacent to sagebrush sites. Periodic burning stimulates manzanita and snowbrush. Incense cedar common on cindery or lava flow substrate in Sisters area. Common species across type are nineleaf lomatium, western yarrow, pinewoods, pussytoes, tailcup lupine, Scoulers hawkweed, strawberry and clarkia. Squirreltail and Ross sedge more common in southern Fremont than Silver Lake or further north. Wheeler bluegrass found only in Fremont stands south of Silver Lake.

Revegetation: Maintain bitterbrush as browse species. Manzanita is not an aggressive increaser with site disturbance. Seeding domestic species as intermediate wheatgrass or hard fescue will require control of Idaho fescue via site scarification.

Silviculture: Poor site for height growth, moderate in basal area stocking. Generally natural regeneration is difficult to establish due to fescue competition. Site scarification necessary for planting. Ponderosa pine is preferred species although some stands on southern Fremont contain white fir in the understory. Stands of mid to upper slope position of buttes have poorest height growth and severest dwarfmistletoe infection.

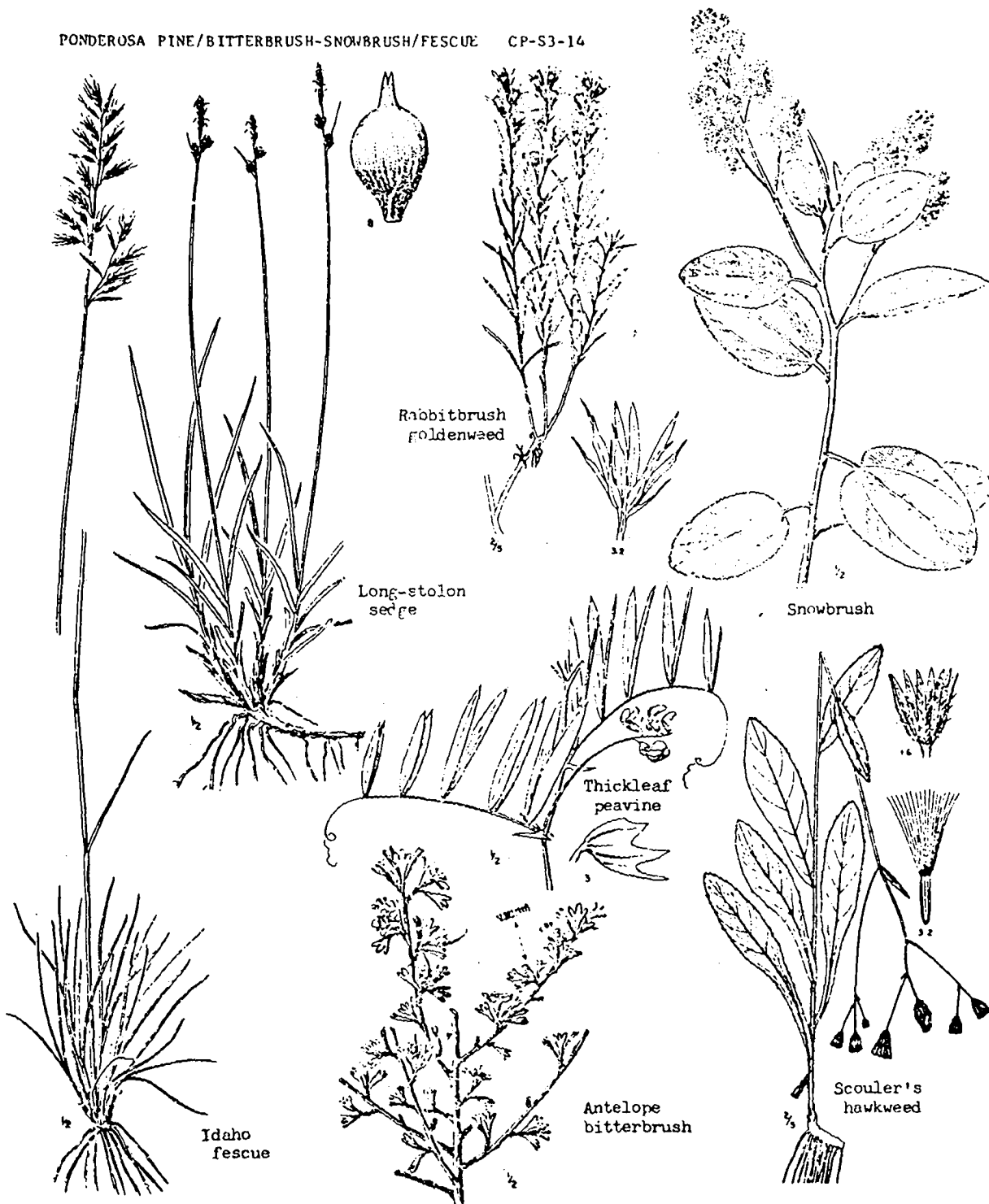
Range Management: Excellent potential as livestock range if provide water. Must force livestock onto fescue to receive allowable utilization. Spring-summer-fall range for mule deer.

Indicators: Goldenweed and gray rabbitbrush increase with site disturbance. Distribution of bitterbrush and manzanita strongly regulated by competitive ability of Idaho fescue. Stands in most northern and southern portion of range have greater tree regeneration potential. Manzanita shows mortality in younger pine stands and with the denser canopy cover of white fir understories.

PRODUCTIVITY

	Forage	SI (PP)	TBA (PP)	GBA10 (PP)	ft.3/yr Index
Mean	93	71	146	114	47
Std Error	12.1	2.9	8.1	7.2	3.2
5% CI	26	6	16	14	6
No. Plots	14	27	27	26	26





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PONDEROSA PINE/BITTERBRUSH-SNOWBRUSH/FESCUE CP-S3-14

ENVIRONMENT

Location: Deschutes NF
Slope position: mid-third
Aspect: northwest, north, east
Slope: 3-6%
Elevation: 3250-4100'
Topography: undulating to rolling
ridge/swale of outwash plains or
plateaus

SOILS

Geology: volcanic sand, pumice/till, basalt, andesite
Surface texture: coarse sandy loam to loamy fine sand
Al+AC depth: 11-25"
Rooting depth: 35-70"
Buried soil depth: 12-26"
Total soil depth: 45-85"
Remarks: particle size usually below 15mm diam.
Underlying material abruptly overlain with volcanic
sand. Pumice highly mixed with buried soil.

VEGETATION

Dominants	% Cover	Status
Ponderosa pine	10-35	Seral, maintained by fire
White fir	.5-2	Climax, as seed and saplings
Bitterbrush	0-20	Decreaser
Snowbrush	3-40	Increaser, low palatable
Idaho fescue	1-20	Decreaser, low palatable
Long-stolon sedge	1-12	Increaser, rhizomatous
Thickleaf peavine	.5-20	Increaser

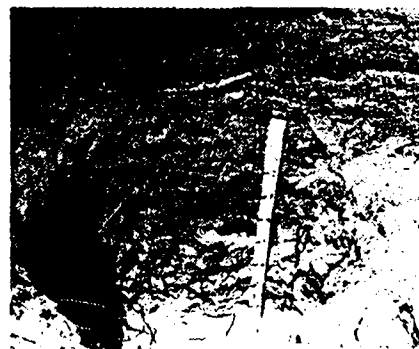
Ground vegetation: Greenleaf manzanita and goldenweed
subordinates in least disturbed sites. Common herbaceous
plants are Scouler's hawkweed, kelloggia, western yarrow,
and western needlegrass. White fir as scattered regen-
eration. Pinegrass may be present as a weak subordinate.

Revegetation: Species adapted to moist and moderately
dry sites; include mountain brome, hard fescue, inter-
mediate wheatgrass.

Silviculture: Moderately high site productivity.
Natural regeneration fairly common, light scarification
during harvest desirable. Scarification necessary for
planting due to sedge and fescue competition. Pocket
gophers prevalent in higher elevations. Dwarfmistletoe
absent on pine.

Range management: Marginal for livestock grazing.
Decrease of bitterbrush, snowbrush, and fescue with
canopy closure. Summer range for mule deer.

Indicators: Increase in needlegrass, long-stolon sedge,
greenleaf manzanita, and goldenweed with site disturbance.
White fir increases with elevation.



PRODUCTIVITY

	(5 plots)				ft. 3/yr
	Forage	SI (PP)	TBA	GBA10	Index
Mean	71	84	150	119	55
Std Error	4.0	1.5	9.6	7.5	2.5
5% CI	11	4	27	20	7

PONDEROSA PINE/WOOLY WYETHIA

CP-F1-11



PONDEROSA PINE/WOOLY WYETHIA CP-F1-11

ENVIRONMENT

Location: Bly and Lakeview Ranger District, west of Highway 395
 Elevation: 5000-6400 ft.
 Aspect: All aspects
 Percent Slope: 5-40
 Slope Position: Upper to lower one-third
 Topography: Gentle rolling flats with convex character

SOILS

Geology: Andesite, basalt, rhyolite
 Grass Rooting Depth: 6-11 in.
 Tree/Shrub Rooting Depth: 15-30 in.
 Percent Stone: 5-60
 Texture: Gravelly silt loam to gravelly clay
 Special: Soils easily fluffed; well-drained with gravels. Compaction on clayey soils possible

VEGETATION

<u>Dominants</u>	<u>% Cover</u>		<u>Constancy</u>		<u>Status</u>
	<u>OS</u>	<u>US</u>	<u>OS</u>	<u>US</u>	
Ponderosa pine	10-40	5-50	100	100	Major climax
Western juniper	0-10	0-10	10	80	Minor climax
White fir	0-1	0-10	5	70	Minor climax
Bitterbrush		0-30		70	Increaser
Serviceberry		0-10		60	Increaser
Squawcarpet		0-60		50	Increaser
Wooly wyethia		0-30		100	Increaser
Squirreltail		0-10		95	Increaser
Yarrow		0-10		80	Increaser
Wheeler's bluegrass		0-10		75	Increaser
White hawkweed		0-10		75	Increaser

Ground Vegetation: A variety of brush species may be present on a given site and may include squawcarpet, snowbrush, Oregon grape, mountain-mahogany, basin big sagebrush, bitterbrush, and manzanita. Western juniper present in most stands as a seedling or sapling; white fir regeneration usually more abundant toward the middle or upper elevational limits of the community with incense cedar being found on the more open or dry sites. Some of the more important herbaceous plants, in addition to those mentioned under "Dominants" include: silvery lupine; Ross' sedge; strawberry; long-stolon sedge; and heartleaf arnica. Stands are rarely highly diverse floristically and USUALLY appear as disturbed sites due to the presence of stumps or disturbed soils.

Indicators: Wooly wyethia always present and may be in excess of 50 percent ground cover on recently (3-5 years) disturbed sites. Serviceberry usually present in stands and may be limited to areas directly under existing canopies on recently disturbed sites.

Silviculture: Moderately productive for ponderosa pine on average site. Shelterwoods best suited for site due to site dominating potential of the wooly wyethia. Abundant advanced regeneration of ponderosa pine on majority of sites; white fir advance regeneration may also be cultured on the upper limits of the community. Most stands are OVERSTOCKED in both the old residual trees and the regeneration. Usually sufficient natural tree regeneration in stands. Site will slow down in growth very rapidly on drier sites if stocking level is not controlled. Stockability for ponderosa pine is 77-123 sq.ft. BA/acre.

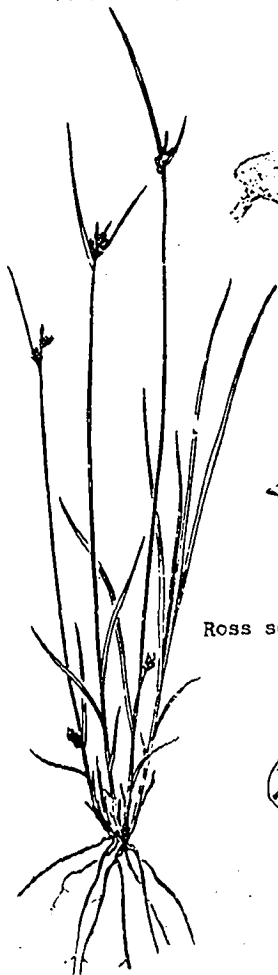
Revegetation: Wooly wyethia and a variety of brush species will quickly dominate site if not treated or managed against via timely planting or grazing. Domestic seed mix of hard fescue and orchardgrass suggested.

Problems Associated with Management: Clear cutting or vast openings in the stands allow a variety of shrubs and herbaceous plants to occupy ground cover and create problems with tree regeneration and desirable grass establishment.

PRODUCTIVITY (16 plots)

	<u>Site Index</u>	<u>TBA</u>	<u>GBA</u>	<u>Ft³/Yr Index</u>
	<u>(PP)</u>	<u>(PP)</u>	<u>(PP)</u>	<u>(PP)</u>
Mean	78	148	100	44
5% CI	4	23	23	11

PONDEROSA PINE/WOOLY WYETHIA CP-F1-11



Ross sedge



Tailcup
lupine



Goosefoot violet



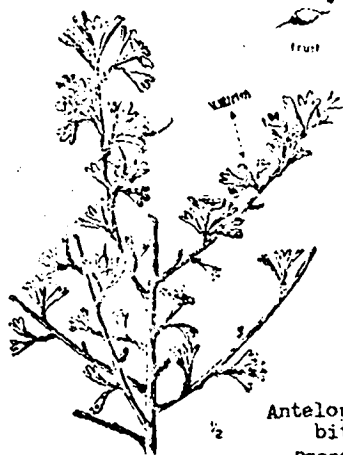
Low penstemon



Western groundsel



Western
needlegrass



Antelope
bitterbrush

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ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
Slope position: lower to upper third
Aspect: all exposures
Slope: 1-50%
Elevation: 2850-5600 ft.
Topography: flat to convex; plateaus, escarpments, benches, ridgetops.

SOILS

Geology: air-laid or flow pumice over lava or outwash
Surface texture: loamy coarse sand, sandy loam to loams
Al+AC depth: 6-30"
Rooting depth: 10-65"
Buried soil depth: 12 - >100"
Total soil depth: 20 - >100"
Stone content: 0-30%
Soil classification:
Remarks: Soils well drained. Cl pumice size varies with distance from Crater Lake (5mm on Sisters and South Chiloquin to 60mm on Chemult, Crescent, Silver Lake). Pumice coarse fragment content 30-80% by volume.

VEGETATION

Dominants	% Cover	Constancy	Status
Ponderosa pine	5-40	100	Major climax
Lodgepole pine	0-15	85	Minor climax to seral with disturbance
Bitterbrush	2-35	100	Decreaser/increaser
Western needlegrass	T-6	100	Palatable increaser

Ground Vegetation: Bitterbrush associated with western needlegrass, squirreltail, and Ross sedge. Floristics of community changes north of Pringle Falls and south of Sprague River. Northern stands represented by yarrow, strawberry, tailcup lupine, Scouler hawkweed, kelloggia, Carey balsamroot, brackenfern and low penstemon. Douglas-fir, incense cedar, juniper, snowberry, goldenweed, rose and serviceberry can be present. Lodgepole pine is usually absent. Stands south and east of Pringle Falls area characterized by goosefoot violet, phacelia, western groundsel, strawberry and mentzelia. Lodgepole pine is aggressive following logging or burning. Ross sedge becomes more prevalent south of Sprague River with western juniper and mountain-mahogany as subordinates in some stands.

Revegetation: Provide bitterbrush as browse for ungulates. Seeding domestic grass is a marginal venture. Intermediate and pubescent wheatgrass do better than other species. Nitrogen-sulfur fertilization often necessary to maintain stand.

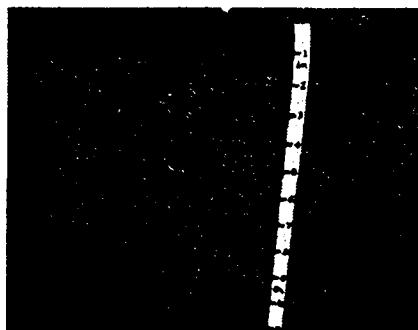
Silviculture: Moderate site productivity. Stands on Chemult, Crescent and Silver Lake Districts contain less natural regeneration than elsewhere and will require site scarification plus overhead shade for establishment. Plant within first 2 years of site scarification. Lodgepole codominance likely on gentle slopes next to cold air drainages and basins. Stands on pumice ash soils have slightly higher stocking levels than where pumice lapilli evident. No significant difference in site index with latitude. Dwarfmistletoe and pocket gophers usually light to absent. Pinestem borer common on flat slopes and coarse soils.

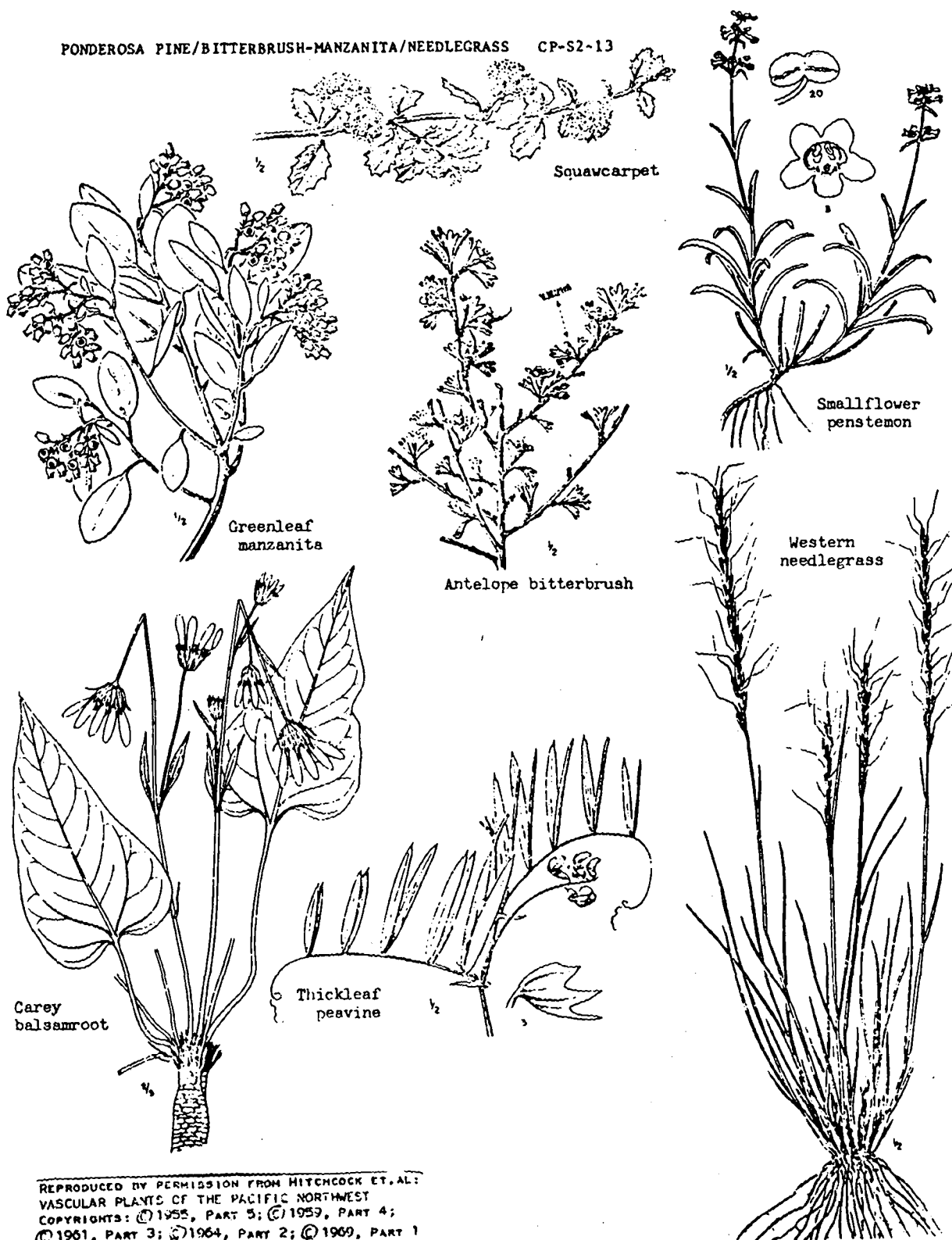
Range and Wildlife Mgt.: Summer range for mule deer; prefer forbs and grasses early then bitterbrush by July. Livestock forage is mainly shrubs unless logging disturbance increases availability and palatability of squirreltail and needlegrass. Community more adapted to sheep than cattle. Bitterbrush decreases with continuous grazing use and following underburning.

Indicators: Strawberry, kelloggia, and brackenfern indicate higher productivity. Western juniper and mountain mahogany indicate shallow soils and low productivity. Strongly clumped regeneration indicates harsh environments for tree establishment.

PRODUCTIVITY

	Forage	SI (PP)	TBA (PP)	GBA10 (PP)	ft.3/yr Index
Mean	27	81	108	89	40
Std Error	5.1	1.1	4.9	5.7	2.6
5% CI	10	2	9	11	5
No. Plots	31	36	36	31	31





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ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
 Slope position: mid to upper third
 Aspect: all exposures
 Slope: 5-40%
 Elevation: 3000-5900'
 Topography: flat to convex rolling
 to hilly; plateaus, escarpments,
 buttes, ridge slopes.

SOILS

Geology: air-laid pumice/lava colluvium, cinders
 Surface texture: loamy coarse sand
 Al+AC depth: 6-24"
 Rooting depth: 24-60"
 Buried soil depth: 12 - > 100"
 Total soil depth: 30" - > 100"
 Remarks: soils are well drained throughout growing
 season. Buried soils can be very stoney. Northern
 Deschutes and Fremont profiles are well-mixed with
 buried soil. Community occurs within thermal belt
 of mountain slopes.

VEGETATION

<u>Dominants</u>	<u>% Cover</u>	<u>Status</u>
Ponderosa pine	5-40	Climax
Greenleaf manzanita	1-40	Increaser when disturbed
Bitterbrush	5-30	Decreaser/increaser
Western needlegrass	T-5	Increaser

Ground vegetation: Lodgepole pine can be present but is very subordinate to ponderosa. Douglas-fir, incense cedar, white fir and larch are common in northern-most stands. Snowbrush can be present but not common. Northern Deschutes stands may have pinegrass, kelloggia, hounds-tongue, peavine, low and smallflower penstemon, and Carey balsamroot with squirreltail and Ross sedge dominant over western needlegrass. Squaw carpet and snowberry occurs on shallow, stoney soils of southerly exposures. Southern sites typically have rockcress, mentzelia, goosefoot violet, dogbane and fireweed. The latitudinal variation becomes apparent 50 airline miles north of Crater Lake. Revegetation: Enhance bitterbrush composition whenever possible. Domestic grass seeding is not recommended; intermediate wheat preferred.

Silviculture: Low site productivity. Natural regeneration occurs with snag patches and within shrub influence. Northern sites contain more naturals than further south. Soil scarification and brush control necessary to plant trees. Stocking levels and site index tend to be higher in the north but not statistically so. Manage for ponderosa pine. Dwarfmistletoe common. Gophers absent.

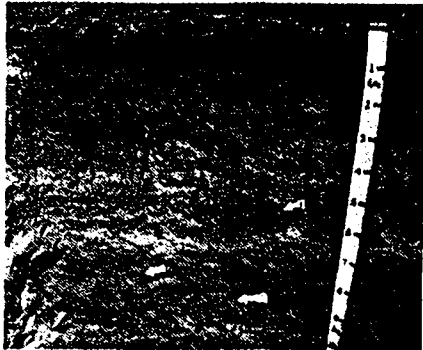
Range management: Deer summer range. Bitterbrush vigor can be poor from continuous summer deer use. Forage for livestock becomes unavailable within 10 years after shrubs increase with logging or burning.

Indicators: Bitterbrush remains codominant or strong subordinate after stand disturbance; manzanita and snowbrush increase. Incense cedar, white fir and Douglas-fir increase with fire protection. Bitterbrush decreases with grazing and tree canopy closure.

PRODUCTIVITY

(17 plots)

	Forage	SI (PP)	TBA	GBA10	ft. ³ /yr Index
Mean	28	76	106	79	33
Std Error	7.1	1.8	4.9	5.9	2.7
5% CI	15	4	10	13	6





Greenleaf
manzanita



Broadleaf
strawberry



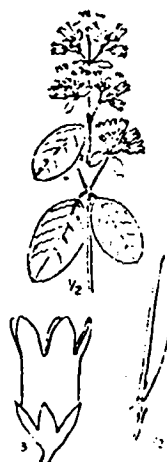
Snowbrush



Western
needlegrass



Antelope
bitterbrush



Low dorbene



Princess pine



Whitevein
pyrola

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
 Slope position: lower to upper third
 Aspect: all exposures
 Slope: 1-20%
 Elevation: 4300-5800'
 Topography: flat to concave; buttes, plateaus, escarpments, fault ridges.

SOILS

Geology: air-laid pumice/lava colluvium, tuff, diatomaceous beds.
 Surface texture: loamy coarse sand to coarse sandy loam
 Al+AC depth: 8-30"
 Rooting depth: 18-70"
 Buried soil depth: 14 - > 100"
 Total soil depth: 24 - > 100"
 Remarks: soils are well drained. Cl particle size 10-50mm in diameter. Usually > 50% coarse fragments by volume.

VEGETATION

Dominants	% Cover	Status
Ponderosa pine	10-50	Climax
Snowbrush	8-50	Increaser
Bitterbrush	2-24	Decreaser
Greenleaf manzanita	0-7	Increaser
Western needlegrass	T-3	Increaser

Ground vegetation: Lodgepole or white fir usually present in understory, and occasionally in overstory as result of fire control. Lodgepole-dominated stands follow conflagration burning. Manzanita becomes codominant following stand disturbance. Scouler willow occasionally present. Common herbaceous species are Ross sedge, dogbane, fireweed, princespine, white vein pyrola and strawberry.

Revegetation: Maintain a bitterbrush component. Seeding of domestic species not recommended without trials. Suggest intermediate, slender or pubescent wheatgrass, hard fescue.

Silviculture: Moderate site productivity. Ponderosa pine regeneration usually common. Scarification or brush control necessary to establish planted stock. Manage for ponderosa pine dominance. Dwarf mistletoe locally severe but not widespread. Gophers not evident. Pineshoot borer risk is high.

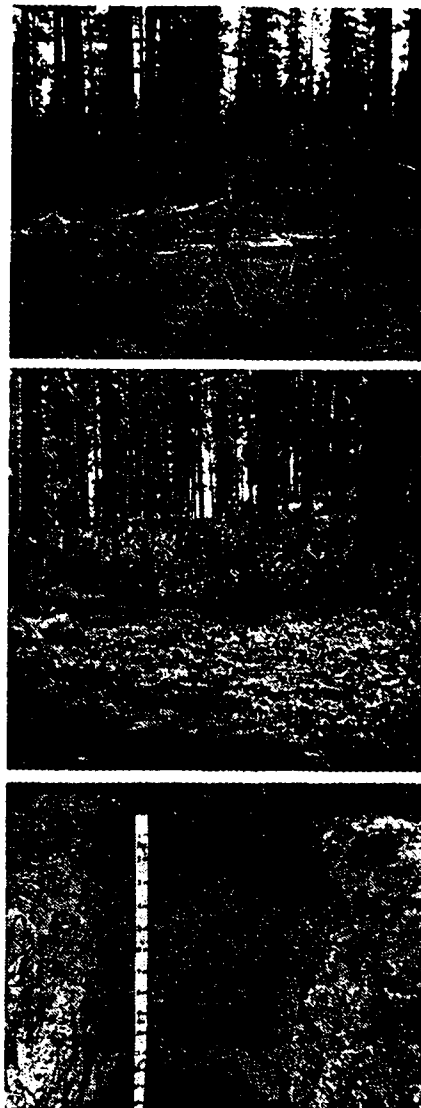
Range management: Important deer summer range. Utilization of bitterbrush strongly influenced by its composition in stand. Marginal as livestock range. Expansion of snowbrush and manzanita will reduce usable forage within 10 years after logging or burning.

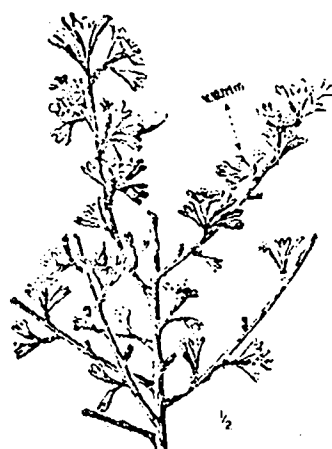
Indicators: Community much more prevalent on Winema NF and coarse pumice than other forests. Highly disturbed sites may appear as brushfields of manzanita and snowbrush.

PRODUCTIVITY

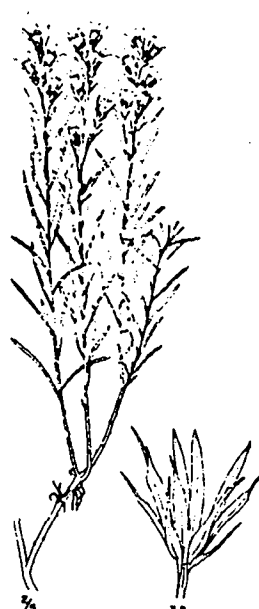
(15 plots)

	Forage	SI (PP)	TBA	GBA10	ft. ³ /yr Index
Mean	10	81	138	117	53
Std Error	2.2	2.1	10.1	9.5	4.8
5% CI	5	5	22	18	10

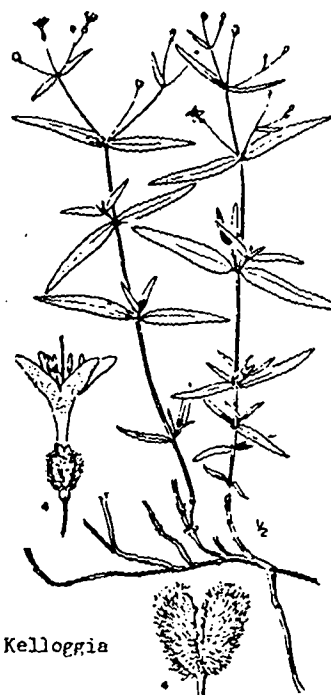




Antelope bitterbrush



Rabbitbrush goldenweed



Kelloggia



Long-stolon sedge



Least lupine



Sulfur buckwheat

Ross
sedge



PONDEROSA PINE/BITTERBRUSH/SEDGE

CP-S2-15

ENVIRONMENT

Location: Deschutes, Winema NF
Slope position: lower to mid third
Aspect: all exposures
Slope: 1-10 (19)%
Elevation: 4900-5900'
Topography: undulating convex and concave; terraces, outwash plains, escarpments, benches, plateaus.

SOILS

Geology: pumice alluvium or flow, scoria flow/pumice
Surface texture: loamy coarse sand to sandy loam
Alt+AC depth: 10-30"
Rooting depth: 20-55"
Buried soil depth: 20 ~ > 100"
Total soil depth: 40 - > 100"
Remarks: soils well drained, restrictive layer to tree rooting usually not present. C horizon particle size and coarse fragments variable as result of parent material. Profiles from scoria flow or pumice can be cobbly.

VEGETATION

Dominants	% Cover	Status
Ponderosa pine	10-40	Climax
Lodgepole pine	1-20	Seral
Bitterbrush	7-40	Decreaser
Western needlegrass	T-10	Increaser
Long-stolon sedge	T-25	Increaser

Ground vegetation: Lodgepole pine is subordinate in least disturbed stands but becomes aggressive following logging, hot burns, or soil displacement activities. Goldenweed is subordinate below 5000' but aggressive with disturbance. Greenleaf manzanita and/or snowbrush may be present but not common. Herbaceous layer has squirreltail, Ross sedge, yarrow, sulfur buckwheat, skeletonweed, least lupine, phacelia, hoary aster and kelloggia.

Revegetation: Maintain bitterbrush component for browse. Utilize native sedges when necessary. Intermediate wheatgrass and smooth brome suggested as domestic species.

Silviculture: Moderate site productivity. Natural regeneration scarce in lower elevations of community and where very cobbly pumice flow occurs. Mechanized planting also difficult on cobbly flow soils. Scarification of sedge necessary for planted stock. Dwarfmistletoe is light to moderate. Gophers absent from most stands.

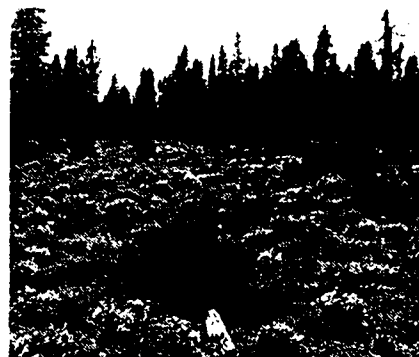
Range Management: Summer range of mule deer. Excellent livestock range, suited primarily to sheep. Herbage production can over double following logging. Water hauling necessary to most areas. Goldenweed dominates in very poor range condition.

Indicators: Expect strong increase in long-stolon sedge and goldenweed following any soil displacement. Density and sociability of sedge changes considerably after logging.

PRODUCTIVITY

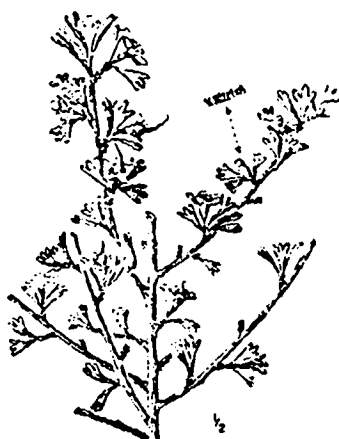
(10 plots)

	Forage	Site Index		TBA	CBA10	ft ³ /yr Index
		(PP)	(LP)			(PP)
Mean	51	83	84	118	82	38
Std Error	9.2	.9	.4	9.5	8.2	3.8
5% CI	20	2	1	22	19	9

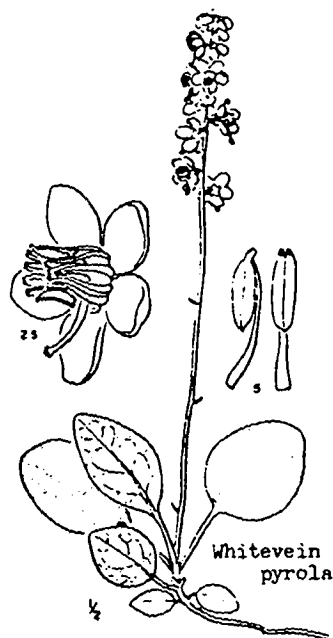




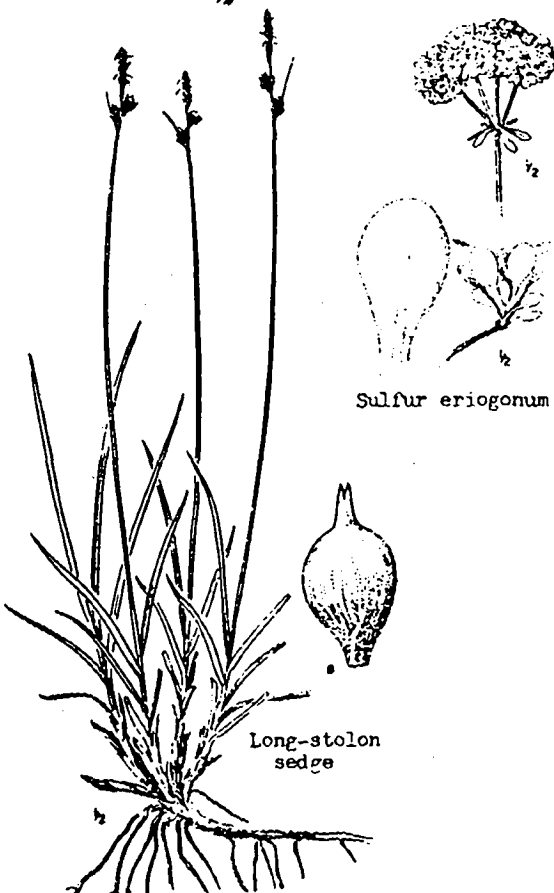
Greenleaf
manzanita



Antelope bitterbrush



Whitevein
pyrola



Long-stolon
sedge



Sulfur eriogonum



Bottlebrush
squirreltail



Ross
sedge

ENVIRONMENT

Location: Winema NF
 Slope position: mid third
 Aspect: east-south
 Slope: 2-12%
 Elevation: 5200-5600'
 Topography: undulating convex and
 concave; benches, plateaus, outwash
 plains.

SOILS

Geology: Basic scoria flow
 Surface texture: sandy loam to loamy coarse sand
 Al+AC depth: 12-25"
 Rooting depth: 35-65"
 Buried soil depth: 30 - > 100"
 Total soil depth: 55 - > 100"
 Remarks: soils well-drained and derived from deep scoria
 deposits in Desert Creek vicinity.

VEGETATION

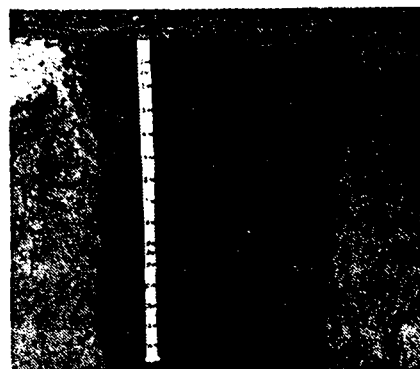
Dominants	% Cover	Status
Ponderosa pine	7-20	Climax
Bitterbrush	20-40	Decreaser
Greenleaf manzanita	2-25	Increaser
Western needlegrass	2-7	Increaser
Long-stolon sedge	5-15	Increaser

Ground vegetation: Lodgepole pine occasionally present.
 Snowbrush can be present but not common. Forb layer
 represented by western yarrow, kelloggia, rockcress.
 Whitevein pyrola, squirreltail, Ross sedge and sulfur
 buckwheat can be present.

Revegetation: Maintain bitterbrush as source of browse.
 Seeding domestic species not recommended on these harsh
 sites. Utilize long-stolon sedge whenever possible.

Silviculture: Low site productivity. Natural regenera-
 tion strongly aggregated to openings in tree overstory.
 Recommend site scarification for control of long-stolon
 sedge prior to planting ponderosa pine. Dwarf mistletoe
 is moderate. Gophers occur in vicinity of shrub/grass
 nonforest sites.

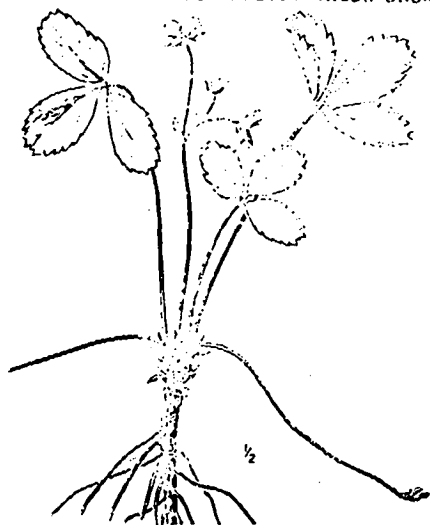
Range Management: Deer summer range. Livestock forage
 provided by bitterbrush and sedge. Expect increase in
 greenleaf manzanita and long-stolon sedge following
 logging and soil displacement. Community is above
 elevational limits of goldenweed.

PRODUCTIVITY

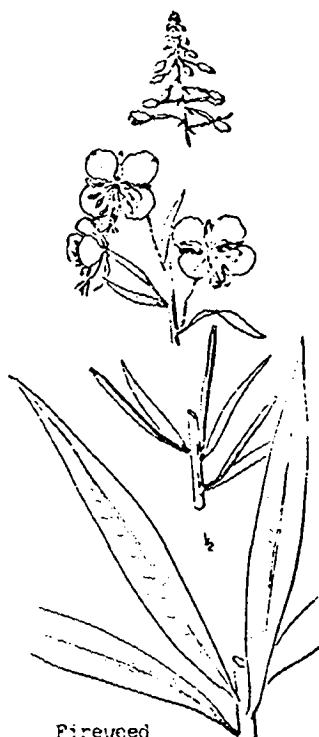
(3 plots)

	Forage	SI (PP)	TBA	GBA10	ft. ³ /yr Index
Mean	50	82	104	53	23
Std Error	16.4	3.4	10.2	15.5	8.0
5% CI	*	15	25	49	*

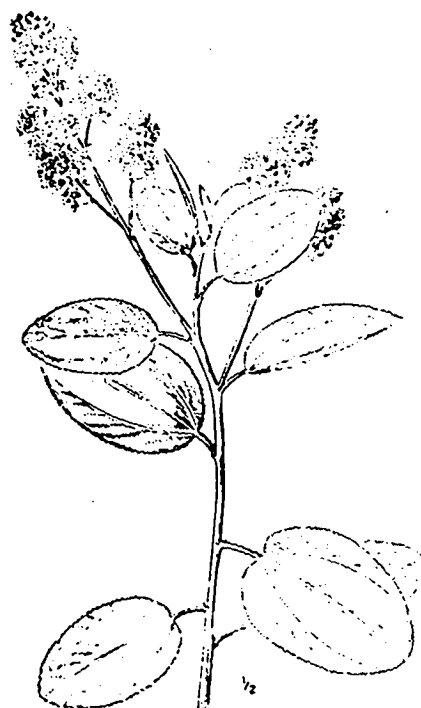
* Sample too variable for CI



Broadpetal strawberry



Fireweed



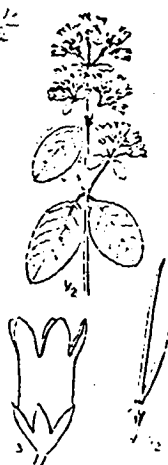
Snowbrush



Long-stolon
sedge



Antelope
bitterbrush



Low dogbane



Greenleaf manzanita

PONDEROSA PINE/BITTERBRUSH-SNOWBRUSH/SEDGE CP-S3-12

ENVIRONMENT

Location: Deschutes, Winema NF
Slope position: lower - mid third
Aspect: all exposures
Slope: 2-10%
Elevation: 4500-5000' (5700)
Topography: Undulating convex to concave; outwash plains, toe of buttes and escarpments.

SOILS

Geology: pumice or scoria flow, pumice, ash/lava flow
Surface texture: loamy coarse sand to fine sandy loam
Al+AC depth: 15-25"
Rooting depth: 36-65"
Buried soil depth: 15 -> 100"
Total soil depth: 50 -> 100"
Remarks: soils well-drained, from deep pumice or scoria flow deposits. Scoria soils may be cobbly. C horizon usually < 25mm particle size and < 50% coarse fragments by volume.

VEGETATION

Dominants	% Cover	Status
Ponderosa pine	8-50	Climax
Lodgepole pine	0-10	Seral
Bitterbrush	3-35	Decreaser
Snowbrush	3-20	Increaser
Western needlegrass	T-10	Increaser
Long-stolon sedge	2-25	Increaser

Ground vegetation: Lodgepole pine usually subordinate except after logging or burning. White fir can be present as regeneration or poles. Bitterbrush can be very subordinate to snowbrush in seral stands dominated by lodgepole or in vicinity of the mixed conifer/snowbrush/sedge community. Greenleaf manzanita and goldenweed subordinate. Diagnostic species are squirreltail, yarrow, kellogia, fireweed, dogbane, strawberry, skeletonweed, pinedrops. Deschutes stands may have pinemat manzanita.
Revegetation: Maintain bitterbrush as browse. Utilized long-stolon sedge whenever possible. Intermediate wheatgrass, orchardgrass, smooth brome suggested for road construction seeding.

Silviculture: Moderate site productivity. Natural regeneration difficult to establish whenever sedge dominates understory. Naturals usually date from last ground fire. Planting requires scarification of sedge. Achieve stocking level by planting. Dwarfmistletoe light with localized pockets of heavy infection. Gophers in vicinity of shrub-sedge non-forest sites.

Range Management: Summer range for mule deer. Livestock forage provided by bitterbrush and sedge. Water hauling necessary. Severe skidding displacement may reduce availability of forage by expansion of manzanita, snowbrush and goldenweed.

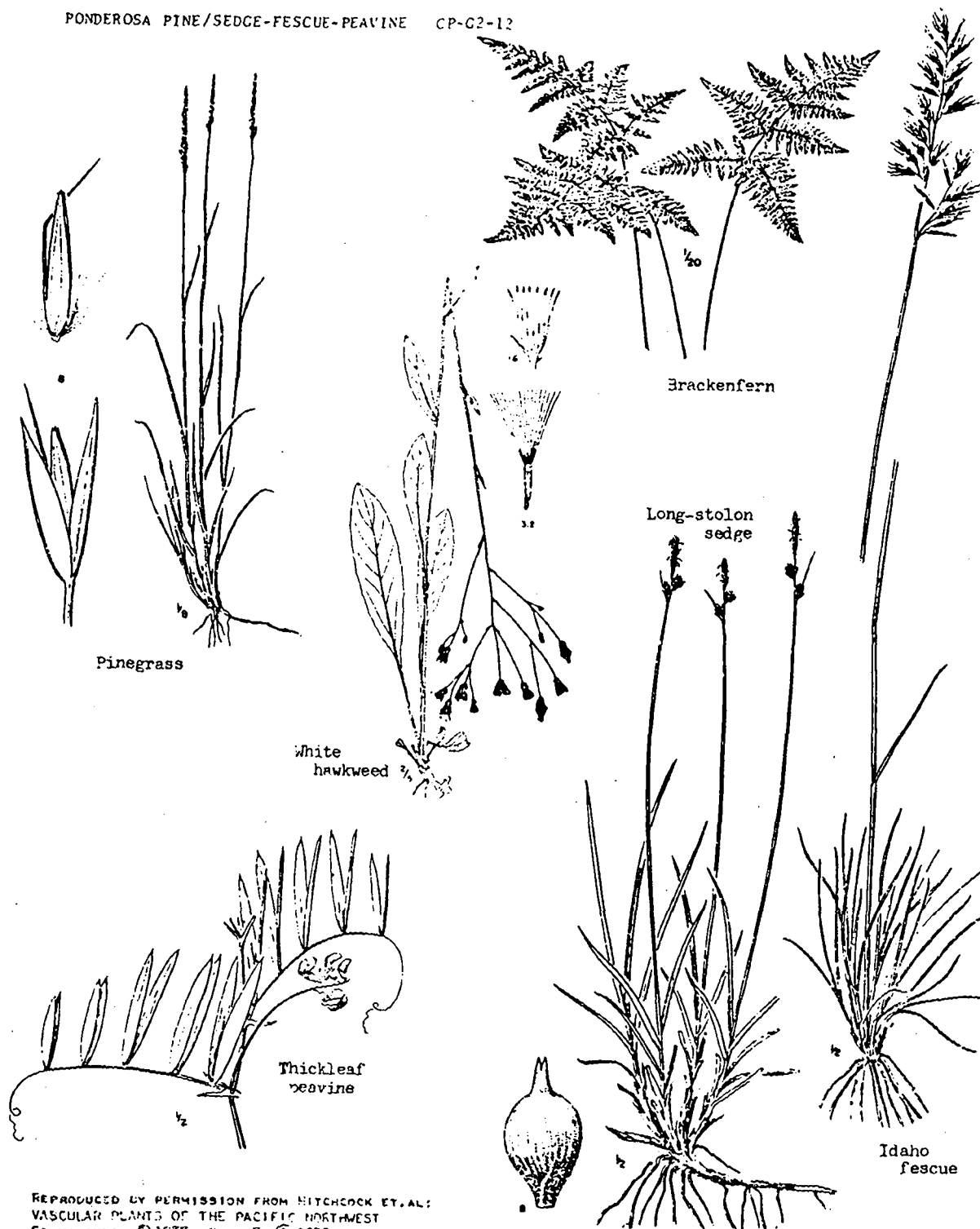
Indicators: Expect strong increase in greenleaf manzanita and long-stolon sedge with soil displacement.

PRODUCTIVITY

(7 plots)

	Forage	SI (PP)	TBA	GBA10	ft. ³ /yr Index
Mean	52	83	116	80	36
Std Error	10.5	2.0	7.8	3.9	1.6
5% CI	27	5	19	10	4





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PONDEROSA PINE/SEDGE-FESCUE-PEAVINE

CP-G2-12

ENVIRONMENT

Location: Deschutes NF
Slope position: lower to mid-third
Aspect: all exposures
Slope: 0-40%
Elevation: 3800-4800'
Topography: undulating to rolling
microridge/swale of terraces,
outwash plain and toeslopes.

SOILS

Geology: pumice or volcanic sand/outwash, till, colluvium
Surface texture: loamy sand to fine sandy loam
Al+AC depth: 14-34"
Rooting depth: 31-48"
Buried soil depth: 19-34"
Total soil depth: 30-85"
Remarks: surface soil has been reworked since initial
deposition. Coarse fragments to 30% of Al-AC volume.
Cobbles confined to buried soil as 30-90% by volume.
Volcanic sand from Nash Crater.

VEGETATION

Dominants	% Cover	Status
Ponderosa pine	10-50	Climax to high seral
Idaho fescue	1-6	Decreaser
Long-stolon sedge	2-14	Increaser, rhizomatous
Pinegrass	0-11	Decreaser, with crown closure
Thickleaf peavine	3-20	Increaser, rhizomatous
Brackenfern	0-15	Increaser, rhizomatous

Ground vegetation: White fir as occasional reprod in all stands. Community would become white fir-ponderosa mixture with protection from fire or logging. Lodgepole and noble fir as reprod at higher elevations. Shrub layer near absent; snowberry, greenleaf manzanita, princespine occasional. Blue wildrye, mountain or Columbia brome, Idaho fescue, western needlegrass, squirreltail, and bearded melic common. Pinegrass absent from some stands. Common forbs are white and Scouler's hawkweed, whiteleaf phacelia, rough-leaf aster, kelloggia, tailcup lupine, yarrow. Breckenfern may dominate in herbaceous layer.
Revegetation: Species adapted to xeric forest sites as hard fescue, mountain brome, wheatgrasses.

Silviculture: High site productivity. Natural regeneration occasional. Use ponderosa as planting stock and favor species in silviculture system; scarification of herbaceous layer necessary. Site preferred by gophers; expect large population increases after logging. Dwarf mistletoe scarce.

Range Management: Excellent livestock forage either in virgin or disturbed condition. Summer range for mule deer.

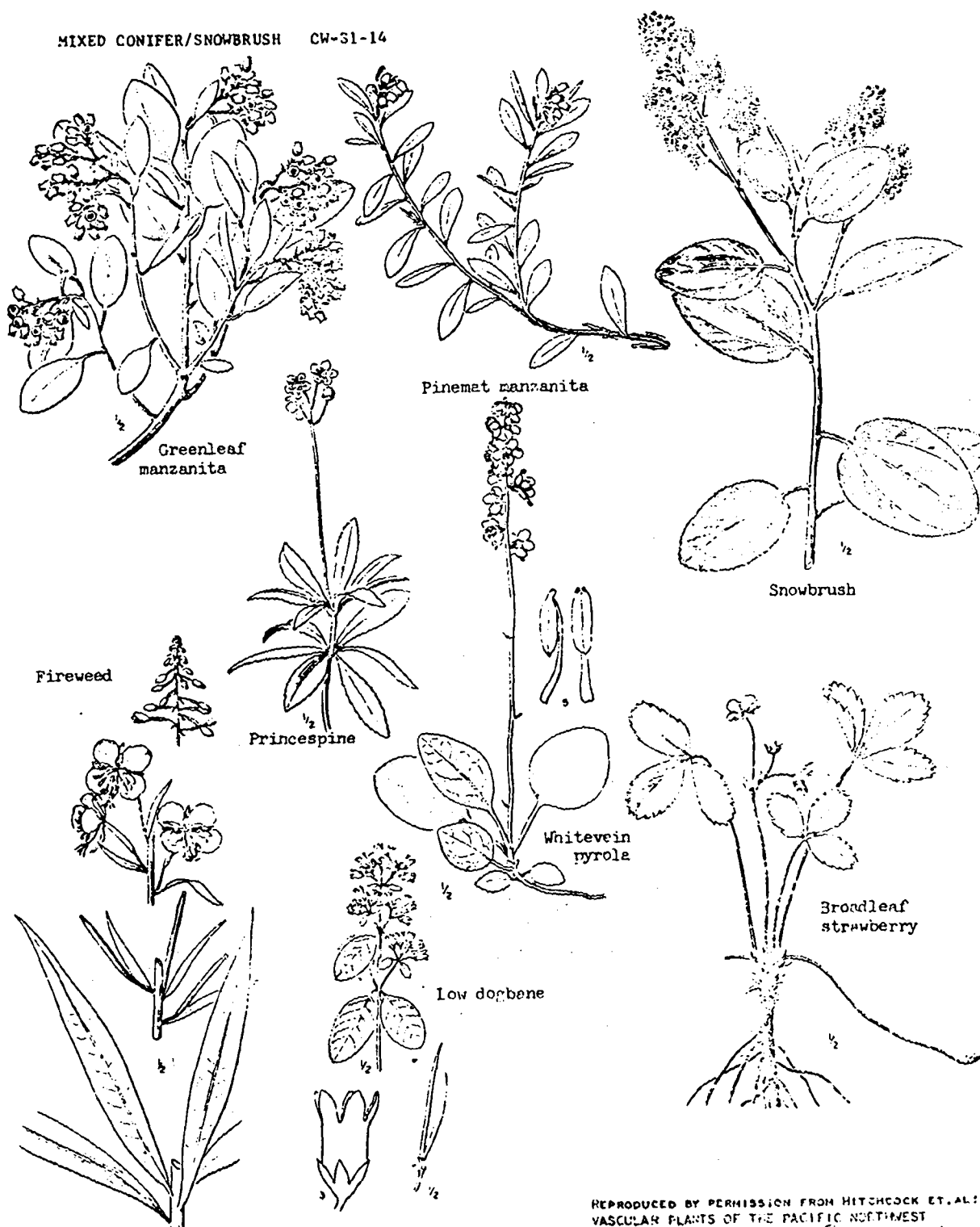
Indicators: Expect increase in pinegrass, peavine, sedge, needlegrass, and squirreltail following soil disturbance. Forage productivity will decline with increase of canopy cover in young pine stands.

PRODUCTIVITY

(6 plots)

	Forage	S1 (PP)	TBA	GBA10	ft.3/yr Index
Mean	301	92	212	181	92
Std Error	80.4	2.7	10.7	20.6	12.2
5% CI	207	7	26	53	32





MIXED CONIFER/SNOWBRUSH

CW-S1-14

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
Slope position: mid third to top
Aspect: all aspects
Slope: 10-25%
Elevation: 5400-6100'
Topography: flat to concave; plateaus, buttes, mountain ridges

SOILS

Geology: air-laid pumice/lava colluvium
Surface texture: loamy coarse sand
Al+AC depth: 6-25"
Rooting depth: 25-42"
Buried soil depth: 18-30" (75)
Total soil depth: 40-55" (80)
Remarks: well-drained soils generally. Soils are shallow and poorly developed. Cl particle size 10-35mm; 45-80% coarse fragments by volume.

VEGETATION

Dominants	% Cover	Status
Ponderosa pine	10-35	High seral
White fir	3-20	Climax
Lodgepole pine	0-20	Seral
Snowbrush	7-34	Increaser
Pinemat manzanita	0-2	Increaser
Greenleaf manzanita	T-7	Increaser

Ground vegetation: Stands typically have ponderosa pine as dominant overstory with lodgepole pine and white fir as poles, regeneration and scattered overstory. Lodgepole and white fir may dominate on north slopes or more mesic environments. Bitterbrush rare. Manzanitas usually subordinate to snowbrush except after logging or burning. Common herbaceous plants are needlegrass, princespine, whitevein pyrola, strawberry, fireweed and dogbane.

Revegetation: Domestic seedings should favor orchardgrass, smooth brome, hard fescue, intermediate wheatgrass, timothy.

Silviculture: Moderate site productivity. Natural regeneration not difficult to establish. Brush control necessary for planting of old burns or logging sites. White fir is favored by selection or shelterwood systems Dwarf mistletoe locally heavy. Gophers occasional. Pine shootborer risk is high.

Range Management: Community provides little palatable forage for deer or livestock.

Indicators: Marginal site for bitterbrush. Manzanita and snowbrush increase with disturbance and degenerate as tree cover increases.

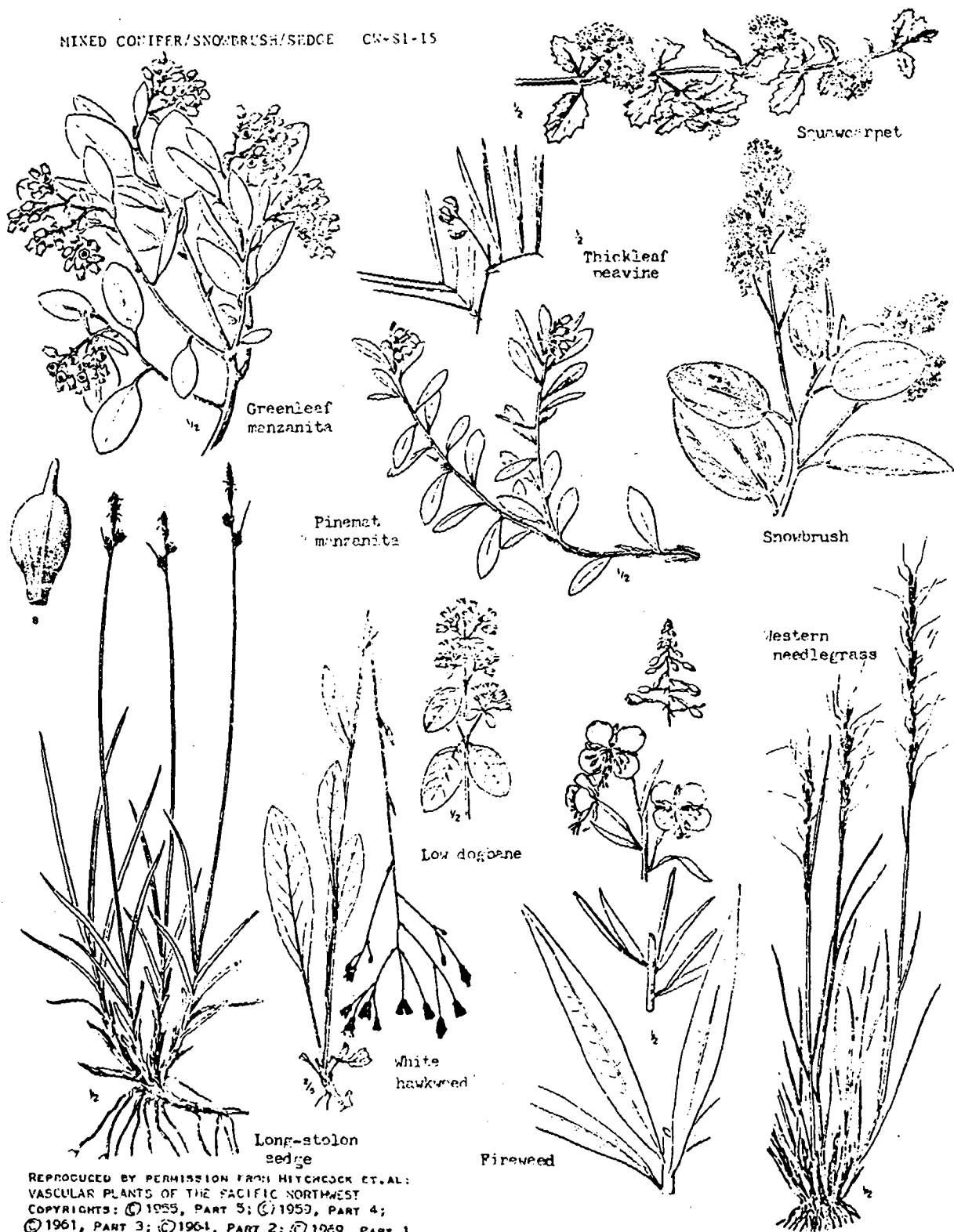


PRODUCTIVITY

(7 plots)

	Site Index (PP)	(WF)*	TBA	GBA10	ft. ³ /yr Index
Mean	80	90	142	98	44
Std Error	2.2	2.9	8.1	10.3	4.8
5% CI	5	8	19	25	12

* 6 plots



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MIXED CONIFER/SNOWBRUSH/SEDGE

CW-S1-15

ENVIRONMENT

Location: Deschutes, Winema NF
Slope position: mid to upper third
Aspect: all exposures
Slope: 2-30%
Elevation: 5000-5900' (3300)
Topography: undulating convex to concave; outwash plains, butte toeslopes, escarpments.

SOILS

Geology: air-laid or transported pumice, or ash/lava flow
Surface texture: loamy coarse sand to loamy sand
Al+AC depth: 8-25"
Rooting depth: 40-72"
Buried soil depth: 15-50"
Total soil depth: > 50"
Remarks: soils are well-drained and usually reworked in surface horizons. C horizon usually 6-20mm particle size, 40-85% coarse fragments.

VEGETATION

Dominants	% Cover	Status
Ponderosa pine	15-50	Minor climax
Lodgepole pine	11-21	Seral
White fir	T-30	Major climax
Snowbrush	8-30	Increaser
Western needlegrass	T-10	Increaser
Long-stolon sedge	3-35	Increaser, rhizomatous

Ground vegetation: Lodgepole pine usually subordinate except after logging or burning. White fir, sugar pine, or Shasta red fir can be present as advanced regen. or overstory. Bitterbrush not common and usually absent above 5000' elevation. Greenleaf and pinemat manzanita, squawcarpet, can be present but usually subordinate to snowbrush. Common herbs are squirreltail, yarrow, kelloggias, fireweed, dogbane, strawberry, and skeletonweed. Deschutes stands may have houndstongue, peavine, white hawkweed and western gromwell with squaw currant and chinkapin on lava flows. Graycoys penstemon strongly aggregated and less than 5% cover. Winema stands have goldenweed and squawcarpet on escarpment sites.

Revegetation: Utilize long-stolon sedge whenever possible. Orchardgrass, smooth brome suggested for road construction seeding.

Silviculture: Moderately-high site productivity. Natural regeneration difficult to establish whenever sedge dominates understory. Planting requires scarification of sedge. Achieve stocking level by planting. Dwarf mistletoe light. Pocket gophers light or absent in least-disturbed stands.

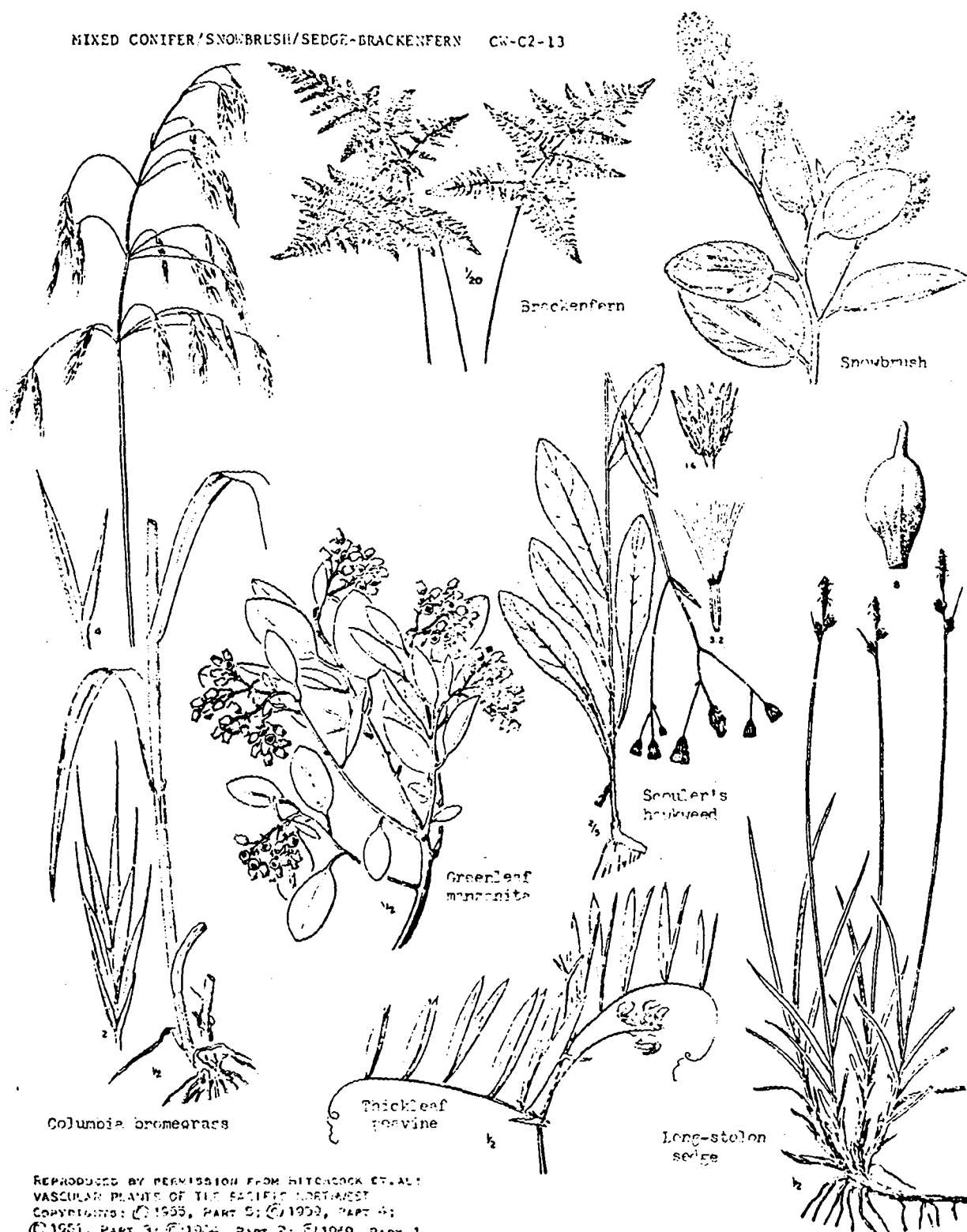
Range management: Summer range for mule deer. Livestock forage provided by sedge. Availability of forage may be reduced by crown closure of mesic tree species or expansion of increaser shrubs after logging or burning.

Indicators: Expect strong increase in long-stolon sedge, pinemat and greenleaf manzanita with logging disturbance. Snowbrush decreases or absent with tree crown closure.

PRODUCTIVITY

	(6 plots)				
	Forage	SI (PP)	TBA	GBA10	ft. 3/yr Index
Mean	28	83	161	123	56
Std Error	6.2	2.9	11.5	14.3	7.2
5% CI	17	7	29	37	18





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MIXED CONIFER/SNOWBRUSH/SEDGE-BRACKENFERN

CW-C2-13

ENVIRONMENT

Location: Deschutes NF
Slope position: lower to upper third
Aspect: all exposures
Slope: 1-45%
Elevation: 3500-4500'
Topography: undulating to rolling
microridge/swale slopes; escarpment
toe, butte toe, and outwash plains.

SOILS

Geology: volcanic scoria, redeposited sands and pumice/
cinders, glacial till, lava colluvium.
Surface texture: loamy sand to loamy fine sand.
Al+AC depth: 12-34"
Rooting depth: 26-60"
Buried soil depth: 12-24"
Total soil depth: 40-85"
Remarks: Pumice, when present, < 5mm. Blue Lake
scoria 15-35mm and usually discontinuous over buried
soil. Stone content 0-75%.

VEGETATION

Dominants	% Cover	Status
Ponderosa pine	8-45 (60)	Seral, maintained by fire
White fir	0-20	Climax
Douglas-fir	0-20	Minor climax
Snowbrush	10-40	Increaser
Greenleaf manzanita	T-10	Increaser
Long-stolon sedge	1-6	Increaser, rhizomatous
Brackenfern	5-30	Increaser, rhizomatous

Ground vegetation: Stands either dominated by ponderosa pine or pine subordinate to white and Douglas-fir. The ponderosa pine phase occurs on xeric exposures of outwash plains, plateaus, and cinder cones. Mixed conifer stands restricted to immediate slopes of Cascades. Snowbrush usually dominate over manzanita. Chinkapin absent. Idaho fescue and pinegrass can be absent. Sedge co-dominant with squirreltail, needlegrass, mountain or Columbia brome. Brackenfern is layer dominant. Common forbs are fireweed, kelloggia, thickleaf peavine, white and Scouler's hawkweed, western houndstongue.

Revegetation: Species adapted to moist forest sites; include mountain brome, hard fescue, and orchardgrass.

Silviculture: Moderate site productivity. Natural regeneration common. Scarification necessary for planting due to sedge and brackenfern competition. Pocket gophers as light infestation or absent. Dwarfmistletoe absent.

Commandra rust prevalent.

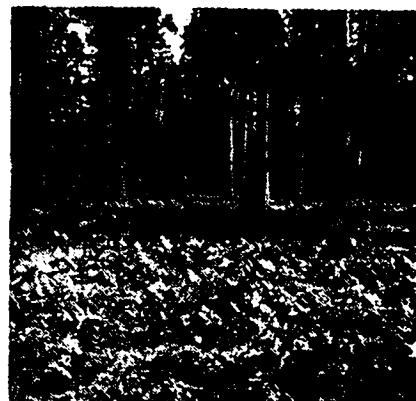
Range Management: Marginal livestock range. Summer range for mule deer.

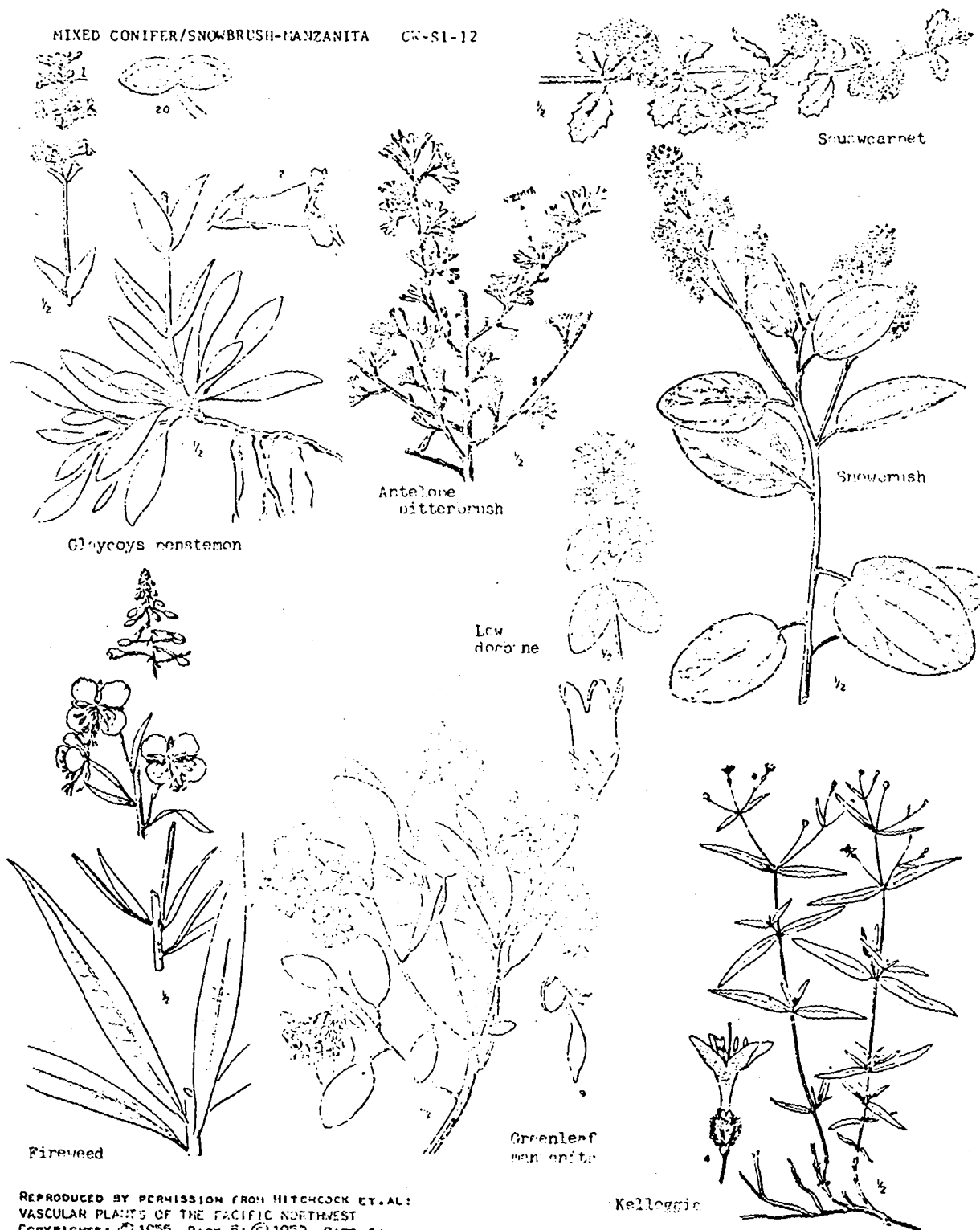
Indicators: Decrease in brackenfern, snowbrush, manzanita with canopy closure of young stands. Increase in long-stolon sedge, brackenfern, peavine, snowbrush and manzanita with soil disturbance. Gophers not prevalent following logging.

PRODUCTIVITY

(5 plots)

	SI (PP)	TBA	GBA10	ft. ³ /yr Index
Mean	81	171	121	54
Std Error	2.1	12.1	9.4	4.4
5% CI	6	33	26	12





ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
 Slope position: mid-third to top
 Aspect: all exposures
 Slope: 5-50%
 Elevation: 4100-5900 ft.
 Topography: convex to concave; side-slopes, buttes, ridges, escarpments, plateaus.

SOILS

Geology: air-laid pumice over lava colluvium, cinders, tuff.

Surface texture: coarse sand to loamy coarse sand

Al+AC depth: 7-28"

Rooting depth: 15-75"

Buried soil depth: 10-60"

Total soil depth: 30-80"

Remarks: Soils well-drained throughout year. Soils become shallow, well mixed and ashy plus stoney north of Pringle Falls and in Black Hills of Fremont.

VEGETATION

Dominants	% Cover	Constancy	Status
Ponderosa pine	5-40	100	Major climax, south slopes
White fir	0-25	50	Major climax, north slopes
Sugar pine	0-20	25	Minor climax, north slopes
Snowbrush	1-30	100	Increaser
Greenleaf manzanita	1-23	100	Increaser
Bitterbrush	0-30	93	Decreaser

Ground Vegetation: Much variability in canopy cover of different conifer and shrub species with changes in latitude, aspect and elevation. White fir prevalent on east to north aspects and high elevations. Sugar pine associated with white fir, ponderosa pine and occasional incense cedar above 5000 ft. in Black Hills. Ponderosa pine is the sole dominant on most south and west exposures becoming codominant with white fir and/or sugar pine on northwest and north to east exposures at higher elevations. Douglas-fir and incense cedar may occur in northern Deschutes stands. Manzanita dominates over snowbrush on convex microrelief, southerly exposures and very stoney profiles. Bitterbrush more prevalent at lower slope positions. North Deschutes sites have kelloggias, glaucous penstemon, Carey balsamroot, serviceberry, squawcarpet, prince's pine with Ross sedge, squirreltail and two-flower fescue dominate over needlegrass. Bitterbrush and snowbrush can be absent. In the Black Hills snowbrush is very common together with starwort, dogbane, phacelia, prince's pine and squawcarpet. The coarser pumice soils on Chiloquin, Chemult and Crescent have phacelia, bitterbrush, goldenweed, skeletonweed, strawberry with needlegrass dominant over Ross sedge and squirreltail.

Revegetation: Maintain bitterbrush on gentle slopes and lower elevations for ungulate browse. Intermediate wheatgrass best adapted to coarse-textured pumice. Orchardgrass and smooth brome preferred in Black Hills and north of Pringle Falls.

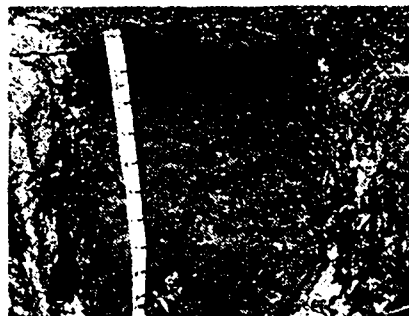
Silviculture: Moderate site productivity. Stands on well-mixed profiles have higher site index and stocking levels than sites on coarse pumice. Natural regeneration variable with elevation, aspect and latitude, more common in extreme north and south of zone. Planting requires control of increaser shrubs. Dwarf mistletoe moderate to heavy. Gophers absent.

Range and Wildlife Mgt.: Community becomes nonrange for livestock with increase of shrubs from logging or burning. Preferred thermal cover for mule deer especially on northerly aspects.

Indicators: Bitterbrush decreases with grazing pressure and tree canopy closure. Manzanita, snowbrush and squawcarpet increase after logging or burning.

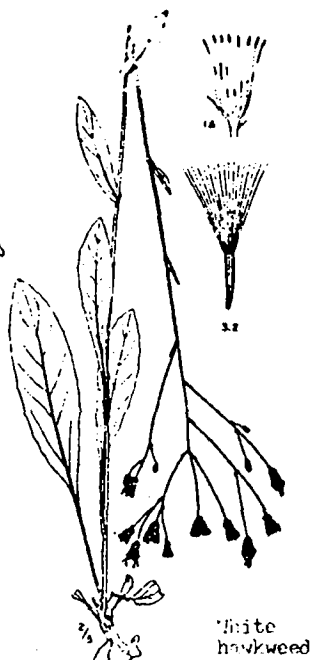
PRODUCTIVITY

	SI (PP)	TBA	GBA10 (PP)	ft. ³ /yr Index
Mean	80	139	118	52
Std Error	1.2	9.0	10.5	4.9
5% CI	2	17	20	10
No. Plots	21	21	20	20

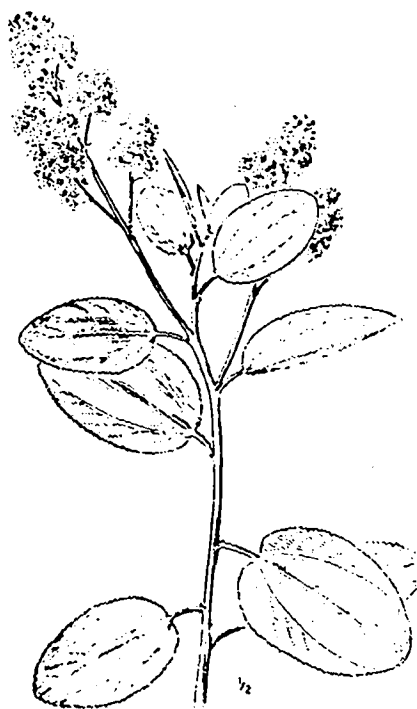




Gaycoys penstemon



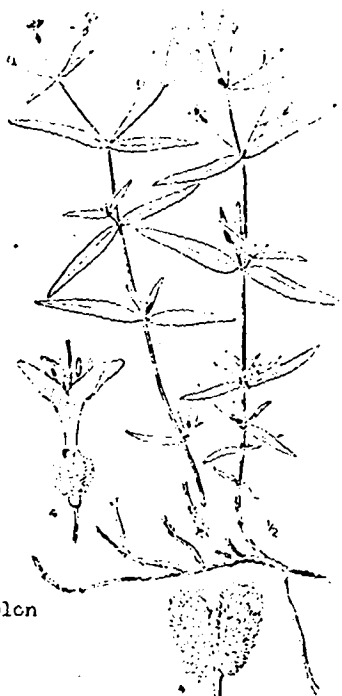
White hawkweed



Snowbrush



long-stolon
sedge



Kelloggia



Greenleaf manzanita

MIXED CONIFER/MANZANITA-SNOWBRUSH/SEDGE-PENSTEMON

CW-S1-13

ENVIRONMENT

Location: Deschutes NF
Slope position: lower to upper third
Aspect: east, north, northwest
Slope: 2-60%
Elevation: 4300-5600'
Topography: undulating to hilly,
convex to concave slopes off ridge-
lines, escarpments, buttes.

SOILS

Geology: pumice ash/lava, cinders, glacial till
Surface texture: loamy coarse sandy to sandy loam
Al+AC depth: 9-32"
Rooting depth: 25-50"
Buried soil depth: 10-40" (65)
Total soil depth: 27-80"
Remarks: pumice particle size 7-15mm diameter. Coarse
pumice lacking. Profiles may contain igneous gravels
throughout.

VEGETATION

Dominants	% Cover	Status
Ponderosa pine	10-60	Seral, maintained by fire
Lodgepole pine	0-5	Seral, maintained by fire
White fir	T-15	Climax, as regeneration
Greenleaf manzanita	T-11	Increaser
Snowbrush	0-40	Increaser
Long-stolon sedge	T-20	Increaser, rhizomatous
Graycoys penstemon	5-60	Increaser, rhizomatous

Ground vegetation: Ponderosa pine is usually the overstory
dominant with white fir, sugar pine, incense cedar and
Douglas-fir in the understory. Snowbrush usually absent
from those stands above 5200' elevation. Goldenweed,
bittercherry, balhip rose and princespine occasional.
Chinkapin absent. Needlegrass and squirreltail subordi-
nate to long-stolon sedge. Pinegrass is rare. Common
forbs are fireweed, kelloggia, strawberry, Scouler's and
white hawkweed, and skeletonweed. Silvery lupine and
houndstongue occasionally present.

Revegetation: Use species adapted to mesic forest sites.
Favor mountain and smooth brome, orchardgrass, hard fescue.
Silviculture: Moderately high site productivity. Natural
regeneration common as ponderosa pine and white fir.
Planting requires scarification of sedge cover. Selection
and light shelterwood favors white fir. Clear-cutting
and heavy shelterwoods favor the pines. Gophers, comman-
dra rust, dwarfmistletoe occasional.

Range management: Marginal livestock range depending upon
density of shrubs and degree of tree crown closure. De-
sirable as transitory range when seed domestic species
after logging. Summer range for mule deer.

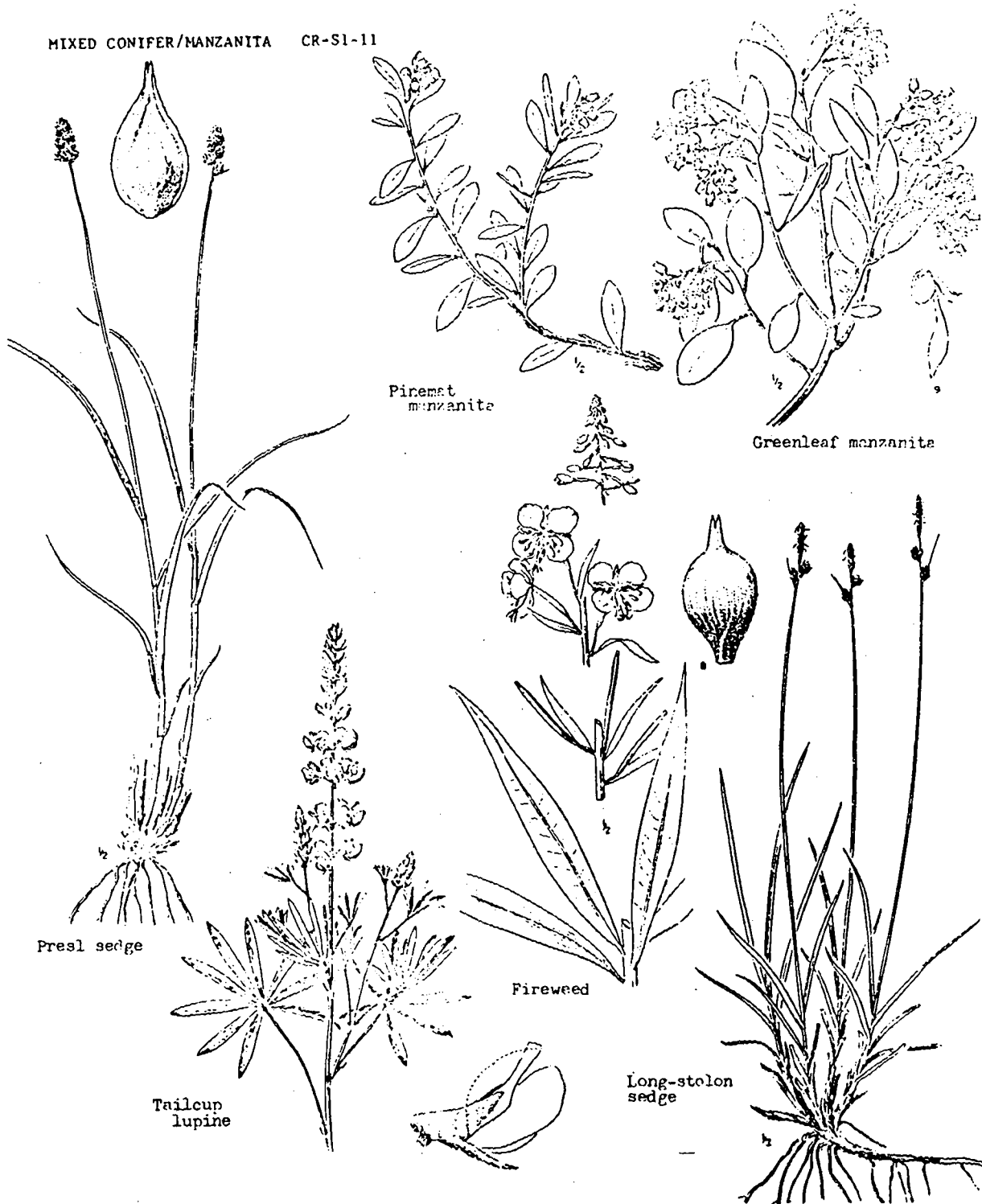
Indicators: Long-stolon sedge, snowbrush and manzanita
increase with soil displacement. Shrub, sedge, and
penstemon cover variable with fire history and canopy
closure. This community is seldom found north of the
McKenzie Highway or south of Cascade Lakes Highway.

PRODUCTIVITY

	(11 plots)				
	Forage	SI (PP)	TBA	GBA10	ft.3/yr Index
Mean	30	83	222	209	97
Std Error	6.4	2.4	10.4	10.0	5.2
5% CI	16	5	23	22	12



MIXED CONIFER/MANZANITA CR-S1-11



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MIXED CONIFER/MANZANITA

CR-S1-11

ENVIRONMENT

Location: Deschutes, Winema NF
Slope position: mid to upper third
Aspect: all exposures
Slope: 5-30%
Elevation: 5450-7000'
Topography: convex; escarpments, ridge
sideslopes, buttes.

SOILS

Geology: air-laid pumice/lava colluvium, cinders
Surface texture: loamy coarse sand to loamy sand
Al+AC depth: 6-20"
Rooting depth: < 48"
Buried soil depth: unknown
Total soil depth: unknown
Remarks: well-drained and poorly developed soils.
High elevation stands of north exposure may have A₂
horizon. Soils highly erodable.

VEGETATION

Dominants	% Cover	Status
Shasta red fir	5-30	Climax
White fir	0-20	Climax
Western white pine	0-20	High Seral
Pinemat manzanita	7-40	Increaser
Greenleaf manzanita	T-25	Increaser

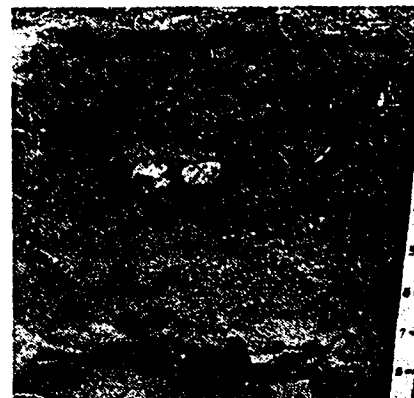
Ground vegetation: Stands rarely dominated by one conifer species but usually a mixture of Shasta red fir, western white pine, mountain hemlock or lodgepole pine. White fir, ponderosa pine, and sugar pine can be present but as subordinates. Manzanitas clearly dominant. Sticky or squaw currant can be present. Herbaceous layer poorly represented by western needlegrass, Ross sedge, long-stolon sedge, Presl sedge, fireweed, tailcup lupine and broadseed or Holboell rockcress.

Revegetation: Growing season too short and pumice soils too coarse-textured to introduce domestic species.

Silviculture: Moderate to low site productivity. Natural regeneration of firs and hemlock is poor. Planting success in these species poor. Disturbed sites revert quickly to lodgepole pine. Windthrow common. Dwarf mistletoe moderate in lodgepole pine. Shasta red fir and mountain hemlock have Indian paint fungus.

Range management: Poor summer range for mule deer due to lack of forage. Nonrange for livestock.

Indicators: Stands characterized by several conifer species in overstory with manzanita as sole dominant. Lodgepole is not the only overstory dominant. Manzanitas increase with logging or burning, as will lodgepole pine.



PRODUCTIVITY (5 plots)			
	SI (SF)	TBA	CBA10
Mean	62	167	122
Std Error	2.1	16.6	14.4
5% CI	7	46	40

MIXED CONIFER/MANZANITA

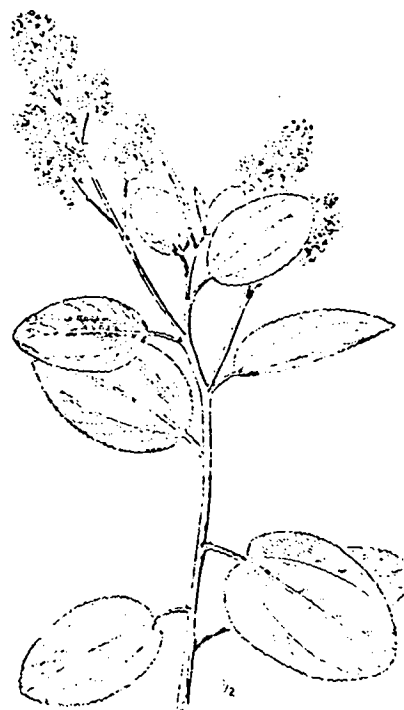
CR-S1-11



Pinenot manzanita



Whitevein myrtle



Snowbrush



Greenleaf manzanita



Golden chinkapin

Princesspine



MIXED CONIFER/SNOWBRUSH-CHINKAPIN

CW-H1-11

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
 Slope position: middle to upper third
 Aspect: west, north, east
 Slope: 15-60%
 Elevation: 4500-5900'
 Topography: convex to concave;
 escarpment and butte slopes.

SOILS

Geology: pumice/basalt or andesite colluvium
 Surface texture: loamy coarse sand to fine sandy loam
 Al+AC depth: 8-32"
 Rooting depth: 21-50"
 Buried soil depth: 65" +
 Total soil depth: 70" +
 Remarks: pumice usually reworked by colluvial action
 near soil surface. Particle size < 35mm diameter.
 Coarse fragment content of C1 < 66% by volume.

VEGETATION

Dominants	% Cover	Status
Ponderosa pine	10-30	High seral
Sugar pine	0-8	High seral
White fir	0-35	Major climax
Douglas-fir (understory)	0-25	Minor climax
Snowbrush	5-20	Increaser
Chinkapin	11-25	Increaser
Dogbane	T-5	Forb indicator
Fireweed	T-5	Forb indicator

Ground vegetation: Tree overstory dominated by ponderosa pine on south aspects with sugar pine, white fir, Douglas-fir or Shasta red fir mainly as regeneration or immatures but as codominants on north aspects. Greenleaf manzanita and bitterbrush rarely exceed 5% cover in virgin stands. Pinemat manzanita codominant in some stands. Needlegrass and Ross sedge, whitevein pyrola and princeps pine widely scattered. Pumice gravels common on soil surface; easily displaced by foot traffic.

Revegetation: Difficult with domestic species because of unraveling pumice on surface. Suggest intermediate and pubescent wheatgrass, orchardgrass.

Silviculture: Moderate site productivity for ponderosa. Natural regeneration common. Favor ponderosa pine in planting and silviculture system. Scarification of brushfields may be necessary. Dwarf mistletoe common in pine. Indian paint fungus on white fir. Gophers absent.

Range Management: Nonrange for livestock due to steep slopes and/or low forage production. Bitterbrush heavily hedged by summer deer use.

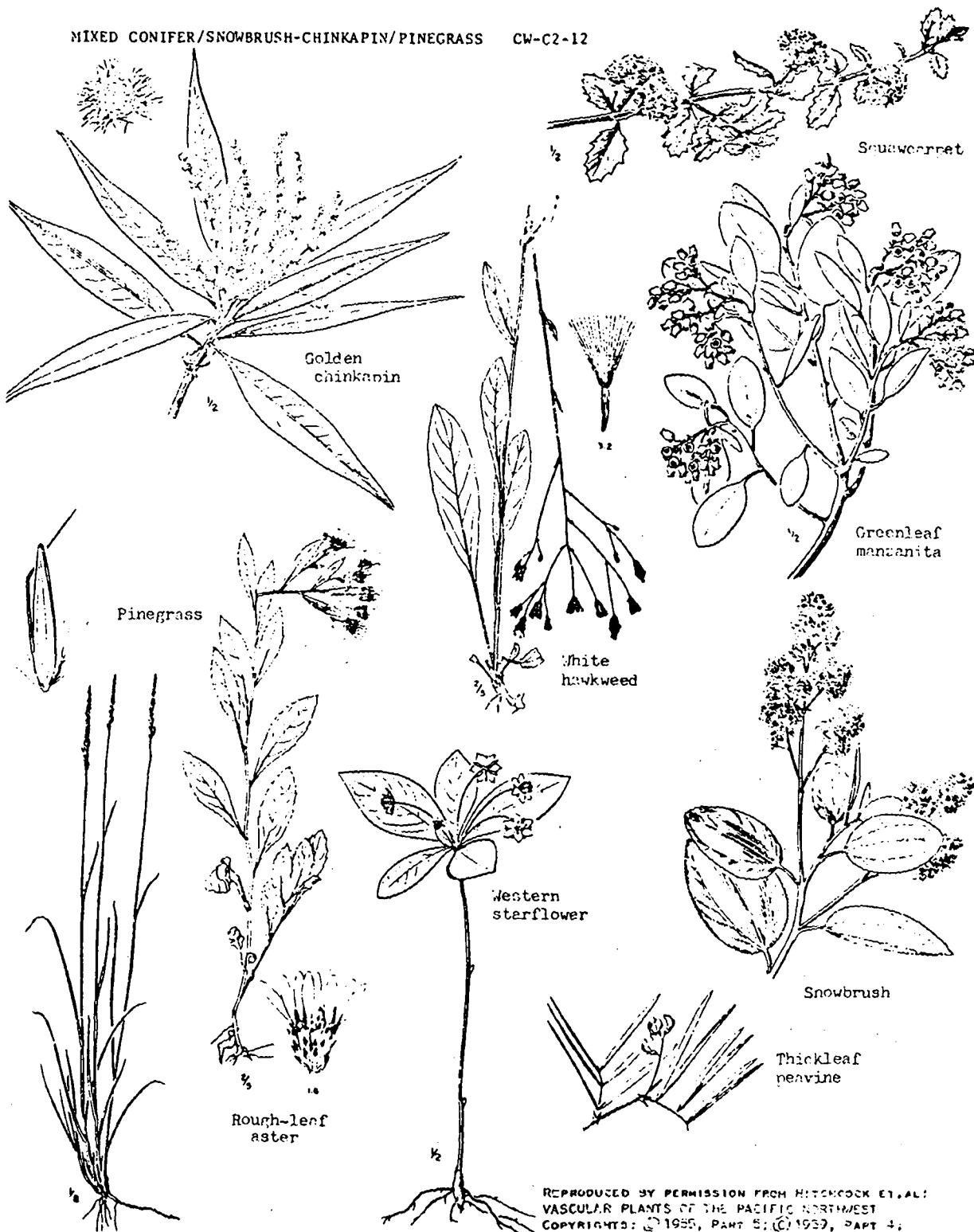
Indicators: Expect considerable increase in snowbrush, chinkapin, and greenleaf manzanita following logging or burning.

PRODUCTIVITY

(5 plots)

	SI (PP)	TBA	GBA10	ft. 3/yr Index
Mean	85	125	115	47
Std Error	5.0	17.3	13.8	9.5
5% CI	14	48	44	26





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MIXED CONIFER/SNOWBRUSH-CHINKAPIN/PINEGRASS

CW-C2-12

ENVIRONMENT

Location: Deschutes NF
Slope position: lower third to top
Aspect: all exposures
Slope: 10-35% (55)
Elevation: 3300-5000'
Topography: concave to convex slopes
of buttes, escarpments, ridges.

SOILS

Geology: pumice ash/lava, glacial till, breccia
Surface texture; loamy coarse sand to loamy fine sand
Al+AC depth: 16-24"
Rooting depth: 20-50"
Buried soil depth: 13-20"
Total soil depth: 34-65"
Remarks: pumice particles to 5mm diameter; highly mixed
with buried soil. Gravel content of Al+AC is < 35%.

VEGETATION

Dominants	% Cover	Status
Ponderosa pine	7-52	Seral, maintained by fire
Douglas-fir	0-40	Climax
White fir	0-40	Climax, as reproduction
Incense cedar	0-10	Seral, as reproduction
Snowbrush	0-20	Increaser
Chinkapin	0-20	Increaser
Pinegrass	5-60	Decreaser

Ground vegetation: Northerly aspects with white fir, western larch associated with Douglas-fir and ponderosa pine. Southerly exposures have incense cedar, Douglas-fir and ponderosa. Shrub layer may include princespine, greenleaf manzanita, rose, snowberry, serviceberry, squaw carpet, oceanspray. Either snowbrush or chinkapin may be absent. Common forbs are fireweed, thickleaf peavine, white hawkweed, strawberry, starflower, silvery lupine, roughleaf aster. Long-stolon sedge absent. Brackenfern very occasional to absent except following logging.

Revegetation: Species adapted to mesic forest site: include orchardgrass, smoothbrome, hard fescue, blue wildrye. Silviculture: High site productivity. Natural regeneration common. Planting requires scarification of pinegrass under good range condition. Clearcuts or heavy shelterwood necessary to maintain pine dominance. Gophers occasional.

Range management: Marginal livestock range without intensive timber management. Excellent potential as transitory range when seed domestic species after logging. Poor range condition has preponderance of forbs with pinegrass in small colonies.

Indicators: Manzanita and squaw carpet suggest stoney soils and xeric sites. Chinkapin, snowbrush, and snowberry indicate ashy, mesic sites. Shrubs never completely dominate due to pinegrass competition; both decrease in cover with increase of tree canopy. Manzanita and snowbrush increase after logging or burning. Snowberry always subordinate to other shrubs.

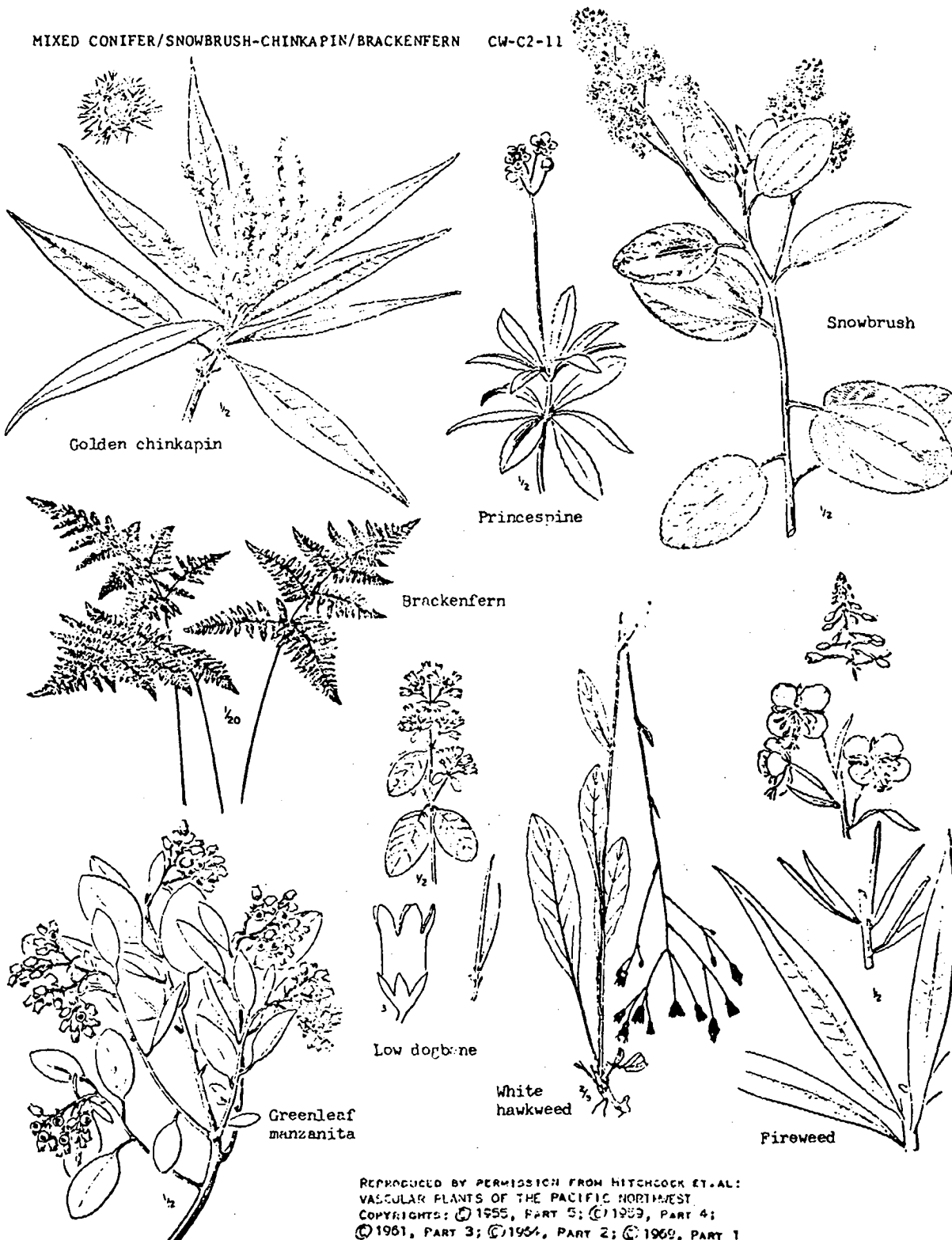
PRODUCTIVITY

(7 plots)

	Site Index			GBA10		ft ³ /yr Index	
	(PP)	(DF)	TBA	(PP)	(DF)	(PP)	(DF)
Mean	89	117	159	145	188	72	115
Std Error	1.7	5.3	10.7	23.9	29.8	12.7	7.1
5% CI	4	23	26	58	*	31	*

* 3 plots; data too variable for confidence interval





MIXED CONIFER/SNOWBRUSH-CHINKQUAPIN/BRACKENFERN

CW-C2-11

ENVIRONMENT

Location: Deschutes NF
Slope position: Mid to upper third
Aspect: All aspects
Slope: 5-48% (60)
Elevation: 3000-4650'
Topography: Convex to concave;
escarpments, buttes, ridges and
outwash plains.

SOILS

Geology: Volcanic scoria or andesite colluvium/
andesite, basalt, glacial till
Surface texture: Loamy coarse sand, coarse sandy loam
Al+AC depth: 6-20"
Rooting depth: 20-85"
Buried soil depth: 6-20"
Total soil depth: 17-85"
Remarks: Blue Lake scoria and colluvial gravels 15-35mm
diameter. Surface deposits abruptly lying over a
buried soil.

VEGETATION

Dominants	5% Cover	Status
Ponderosa pine	10-35	Seral, maintained by fire
Douglas-fir	0-20	Climax, as reproduction
Incense cedar	0-8	Seral, as reproduction
Snowbrush	0-40	Increaser
Chinkquapin	T-20	Increaser, slopes > 10-15%
Greenleaf manzanita	T-20	Increaser
Brackenfern	2-40	Increaser, rhizomatous

Ground vegetation: Ponderosa dominates overstory with Douglas-fir, white fir, incense cedar as understory codominants. Greenleaf manzanita usually subordinate to snowbrush and/or chinkquapin. Pinegrass absent. Needlegrass, squirreltail, Ross sedge or twoflower fescue present. Long-stolon sedge occasional. Common forbs are dogbane, fireweed, kelloggia, houndstongue, white hawkweed, Washington lily, strawberry, Carey balsamroot. Princespine and starflower on mesic slopes.

Revegetation: Species adapted to moist forest site; include orchardgrass, smooth brome, timothy, hard fescue.

Silviculture: Moderately high site productivity.

Natural regeneration common: Douglas-fir and white fir common on north aspects; incense cedar and ponderosa pine dominant on south aspects. Planting requires scarification for long-stolon sedge and brackenfern. Gophers and dwarfmistletoe on pine absent. Commandra rust common.

Range management: Marginal livestock range due to canopy closure on north aspects and prevalence of unpalatable shrubs. Summer range for mule deer.

Indicators: Increase of snowbrush, chinkquapin, manzanita and brackenfern with soil or site disturbance; they decrease with tree canopy closure. Brackenfern less common when competing with long-stolon sedge.



PRODUCTIVITY

(6 plots)

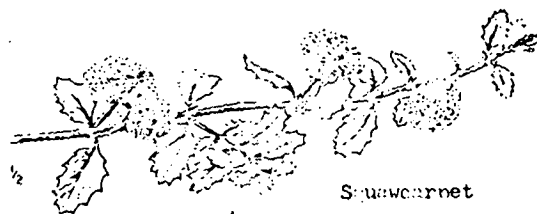
	SI (PP)	TBA	GBA10	ft.3/yr Index
Mean	90	164	130	66
Std Error	1.5	11.6	16.0	8.9
5% CI	4	30	41	23

MIXED CONIFER/SNOWBRUSH-CHINKQUAPIN/BRACKENFERN

CW-C2-11



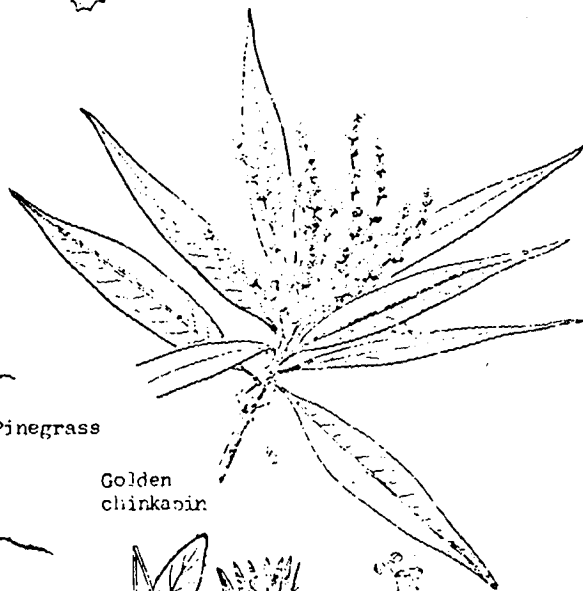
Greenleaf
manzanita



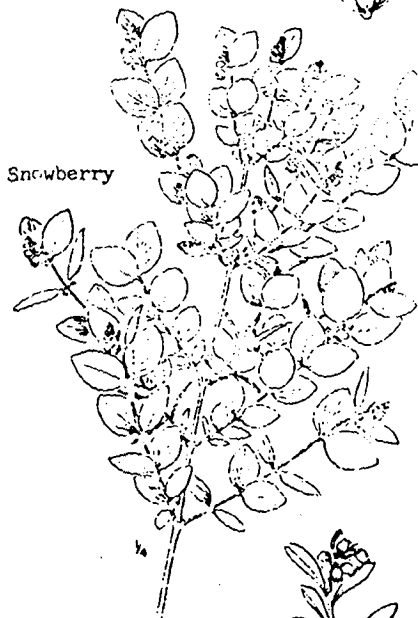
Snowberry



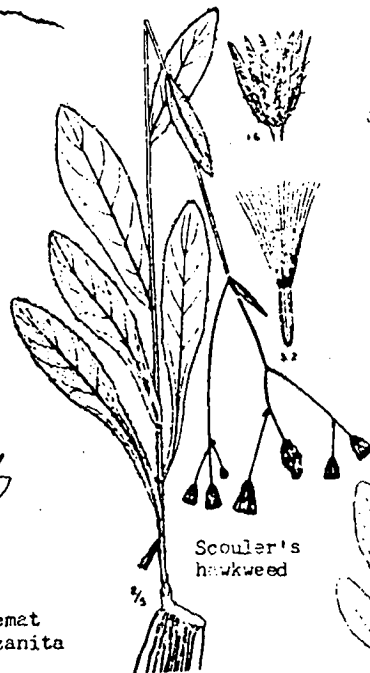
Pinegrass



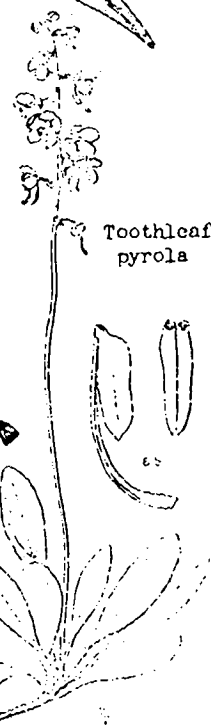
Golden
chinkapin



Snowberry



Scouler's
hawkweed



Toothleaf
pyrola



Thicketleaf
peavine



Pinemat
manzanita

MIXED CONIFER/SNOWBERRY/PINEGRASS

CD-S6-14

ENVIRONMENT

Location: Deschutes NF
Slope position: lower to upper third
Aspect: all exposures (northerly)
Slope: 0-15% (40)
Elevation: 3000-4700'
Topography: concave, flat, convex
slopes; flatter microrelief of
escarpments, plateaus, major
ridgelines.

SOILS

Geology: volcanic ash/lava colluvium or residuum
Surface texture: loamy coarse sand to coarse sandy
loam
Al+AC depth: 9-15"
Rooting depth: 16-48"
Buried soil depth: 9-23"
Total soil depth: 30-68"
Remarks: particle size in surface layers is < 10mm
diameter. Ash is very shallow and highly mixed
with buried soil. Coarse C horizon pumice is rare.
Cobbles exceed 50% by volume on colluvial sites.

VEGETATION

Dominants	% Cover	Status
Ponderosa pine	2-10 (60)	Seral, maintained by fire
Douglas-fir	3-40	Minor climax
White fir	0-30 (60)	Major climax
Snowberry	T-15	Increaser, rhizomatous
Baldhip rose	0-7	Increaser
Serviceberry	0-5	Decreaser
Pinegrass	T-10	Decreaser

Ground vegetation: Incense cedar and western larch occasional as overstory or regeneration. Shrub as snowbrush, serviceberry, greenleaf or pinemat manzanita, chinkapin, oceanspray, princespine subordinate to snowberry. California brome or twoflower fescue subordinate to pinegrass. Common forbs are toothleaf pyrola, skeletonweed, strawberry, Scouler's hawkweed, houndstongue, thistleleaf peavine. Douglas-fir and white fir common in understory unless stand recently burned and dominated by seral ponderosa pine and pinegrass.

Revegetation: Species adapted to forest sites; favor smooth brome, intermediate wheatgrass, hard fescue, orchardgrass.

Silviculture: Moderately high tree productivity. Natural regeneration common. Pine maintained by clear-cutting or heavy shelterwoods. Stand dominance to Douglas-fir/white fir mixture otherwise. Severe scarification necessary in pinegrass sites. Dwarf mistletoe in firs, occasional commandra rust in pines. Gophers occasional after logging.

Range management: Satisfactory as transitory livestock range when seed following heavy overstory removal. Forage production declines from crown closure. Summer deer range.

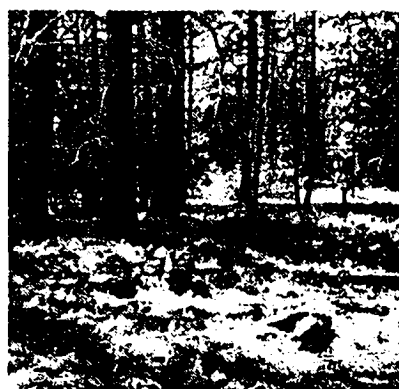
Indicators: Pinegrass decreases with tree canopy closure and is most prevalent in immature pine stands. Chinkapin not very aggressive following soil disturbance. Greenleaf and pinemat manzanita, squawcarpet, princespine, and thistleleaf peavine increase with soil disturbance. Sites from Metolius River and eastward.

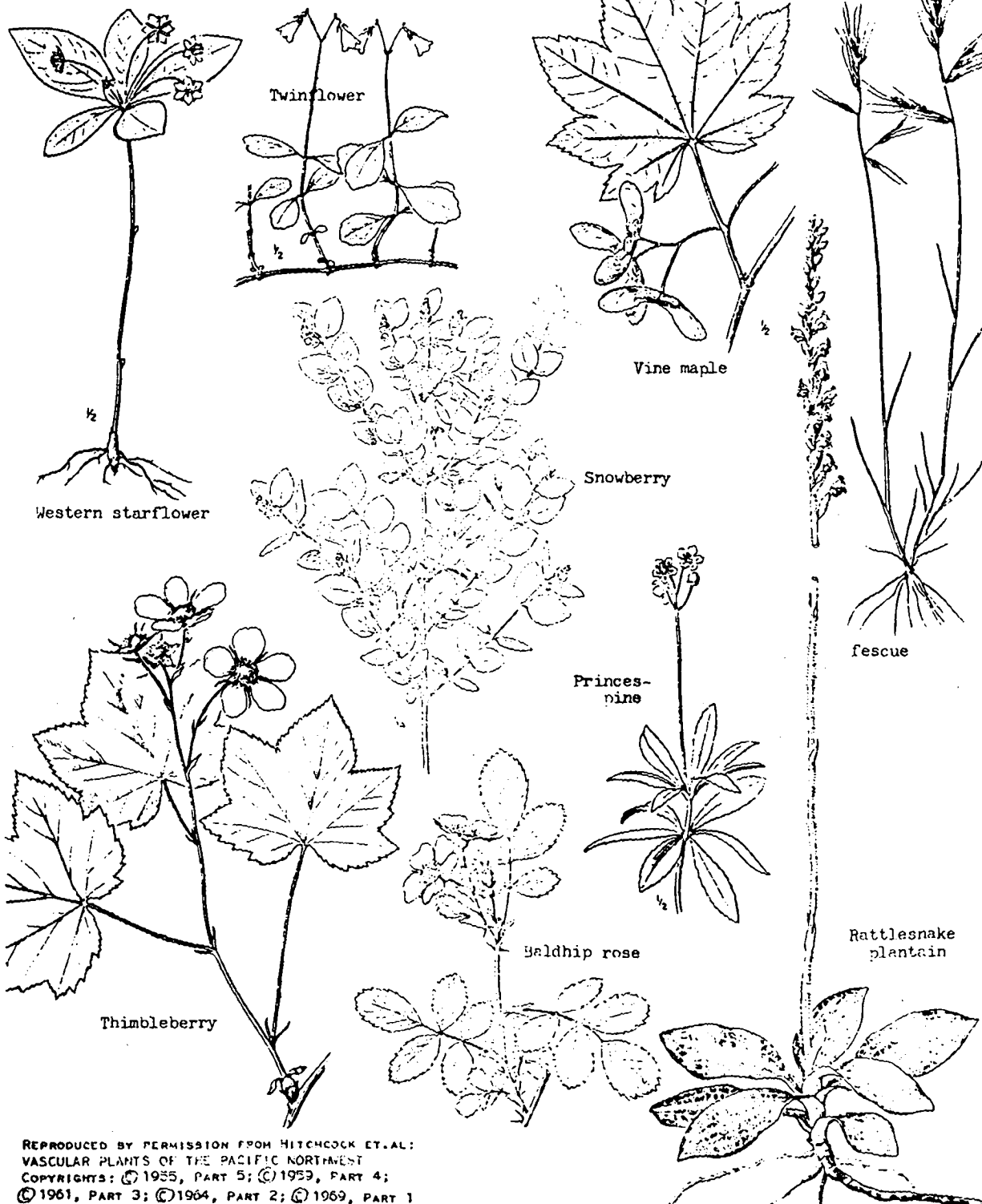
PRODUCTIVITY

(5 plots)

	Site Index			GBA10		ft ³ /yr Index	
	(PP)	(DF)	TBA	(PP)	(DF)	(PP)	(DF)
Mean	85	112	177	169	161	80	106
Std Error	3.1	4.2	8.1	19.4	19.3	11.7	7.5
5% CI	8	12	21	55	53	32	21

See summary table for white fir data





MIXED CONIFER/SNOWBERRY/FORB

CD-S6-13

ENVIRONMENT

Location: Deschutes NF
Slope position: bottom to upper third
Aspect: northwest, north, southeast
Slope: 1-36%
Elevation: 3600-4700'
Topography: concave through convex;
buttes and escarpments, glacial
moraines and terraces.

SOILS

Geology: volcanic sand, scoria or poorly mixed ash/
cinders, glacial till.
Surface texture: loamy coarse sand to loamy fine sand.
Alt+AC depth: 10-32"
Rooting depth: 36-60"
Buried soil depth: 17-38"
Total soil depth: 60-80"
Remarks: Blue Lake scoria with 15-30mm diameter.
Pumice, ash, and Nash Crater sand are finer.
Profiles are usually deep.

VEGETATION

Dominants	% Cover	Status
Ponderosa pine	1-10	Seral, maintained by fire
Douglas-fir	7-70	Minor climax
White fir	0-60	Major climax
Snowberry	T-40	Increaser with disturbance
Trailing blackberry	1-4	Increaser with disturbance
Vine maple	0-10	Increaser
Princespine	1-20	Increaser

Ground vegetation: Mesic sites of glacial microrelief support Pacific silver fir and Engelmann spruce. More xeric sites dominated by Douglas-fir and white fir. Ponderosa pine more prevalent as overstory at lower elevation limits. Big huckleberry, thimbleberry, vine maple, and princespine on mesic sites grade into codominance with snowberry, Oregon grape, oceanspray and rose on drier sites. Common forbs are sweet anise, pyrola, twinflower, western starflower, queencup beadleily, solomonplume, white hawkweed, rattlesnake plantain. Columbia brome, twoflower fescue, and brackenfern may be present. Pinegrass and long-stolon sedge occasional.

Revegetation: Species adapted to mesic forest sites, favor smooth brome, timothy, hard fescue, orchardgrass.

Silviculture: High tree productivity. Natural regeneration commonly dominated by firs. Planting success questionable where volcanic sand or scoria exceeds 24" depth. Pine dominance established by clearcutting. Shelterwoods favor Douglas-firs and true firs. Dwarf-mistletoe common in Douglas-fir, light in pine. Pocket gopher potential high with logging.

Range management: Nonrange for livestock due to predominance of nonpalatable shrubs. Summer deer range.

Indicators: Severe overstory removal and/or soil disturbance gives increase in chinkapin, snowbrush, trailing blackberry, greenleaf manzanita, and twinflower. Slight increase in western starflower with disturbance. Sites located on immediate east slopes of Cascades.

PRODUCTIVITY (10 plots)

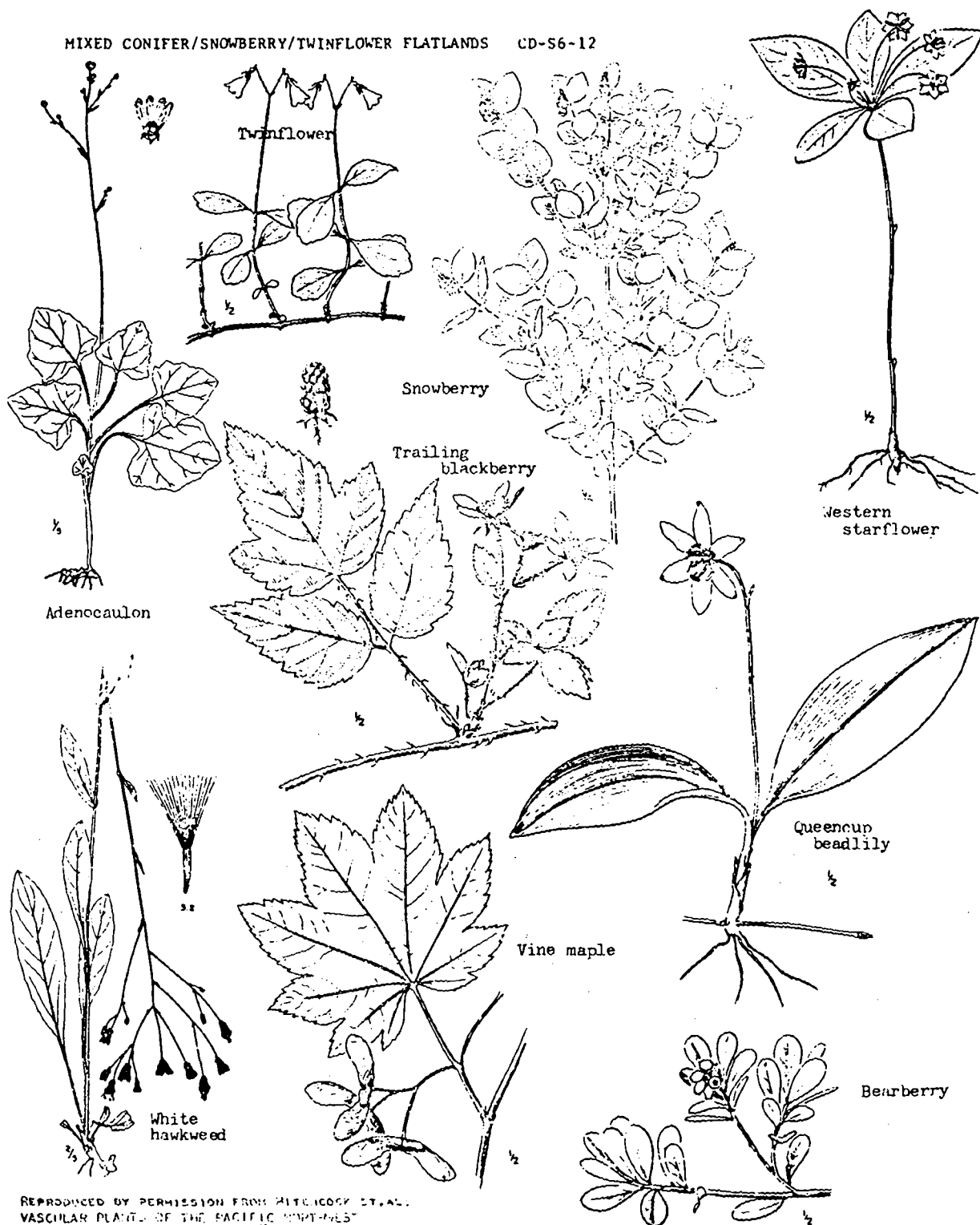
	Site Index			GBA10				ft ³ /yr Index	
	(PP)	(DF)	(WF)	TBA	(PP)	(DF)	(WF)	(PP)	(DF)
Mean	99	130	120	251	276	293	330	151	164
Std Error	.3	2.9	3.6	17.7	17.2	23.6	20.9	16.0	10.5
5% CI	1	6	10	47	74	53	53	43	24

PP=3 plots

WF=6 plots



MIXED CONIFER/SNOWBERRY/TWINFLOWER FLATLANDS CD-S6-12



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MIXED CONIFER/SNOWBERRY/TWINFLOWER FLATLANDS CD-S6-12

ENVIRONMENT

Location: Deschutes NF
Slope position: lower third to bottom
Aspect: south, southeast, east
Slope: 0-6%
Elevation: 3000-3500'
Topography: flat with depressions;
gently undulating slopes of outwash
plains.

SOILS

Geology: pumice or volcanic sand/outwash, cinder,
alluvium.
Surface texture: gravelly loamy sand to fine sandy
loam.
Al+AC depth: 6-36"
Rooting depth: 20-48"
Buried soil depth: 5-30"
Total soil depth: 48-60"
Remarks: pumice has been reworked following initial
deposition. Pumice < 10mm. Outwash gravels common.
A seasonally high water table may be present.

VEGETATION

Dominants	% Cover	Status
Ponderosa pine	2-20	Seral
Western larch	T-30	Seral
White fir (understory)	1-20	Major climax
Douglas-fir (overstory)	1-50	Minor climax
Snowberry	2-30	Increaser
Princespine	5-15	Increaser
Trailing blackberry	1-4	Increaser
Twinflower	T-40	Increaser

Ground vegetation: Bearberry, Oregon grape, vine maple, baldhip rose, bitterbrush, serviceberry, oceanspray and thimbleberry present and occasionally codominant with shrub dominants. Blue wildrye, twoflower fescue, Idaho fescue occur with pinegrass or Columbia brome. Forb layer represented by thistle leaf peavine, white hawkweed, western yarrow, western starflower, queenscup headlily, sweet anise, adenocaulon, and solomonplume. Forbs usually more prevalent than the grass.

Revegetation: Species adapted to mesic forest sites as orchardgrass, hard fescue, and smooth brome grass.

Silviculture: High tree productivity. Natural regeneration common, dominated by Douglas-fir and/or white fir. Planting requires scarification. Pine maintained by clearcutting and planting. Compaction is hazard from moist soils during summer. Dwarf mistletoe on Douglas-fir, pine, and larch. Gophers common.

Range management: Marginal livestock range except as transitory forage supply: follow logging or burning with seeding. Spring-summer-fall deer range.

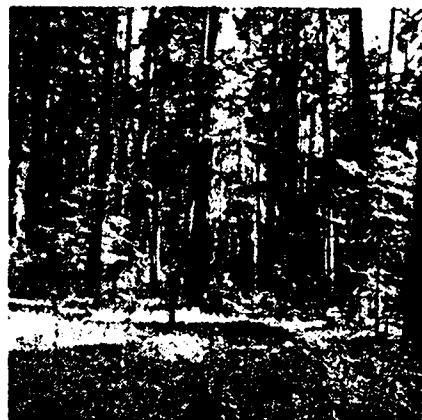
Indicators: Western larch is codominant in many stands. Increase of thistle leaf peavine, princespine, trailing blackberry, twinflower and Columbia brome with soil disturbance. Increase in Douglas-fir, white fir, snowberry, chinquapin, snowbrush and vine maple as increase in elevation from Metolius River toward Cascade Mts. Lower elevations dominated by ponderosa pine, western larch, grasses and forbs.

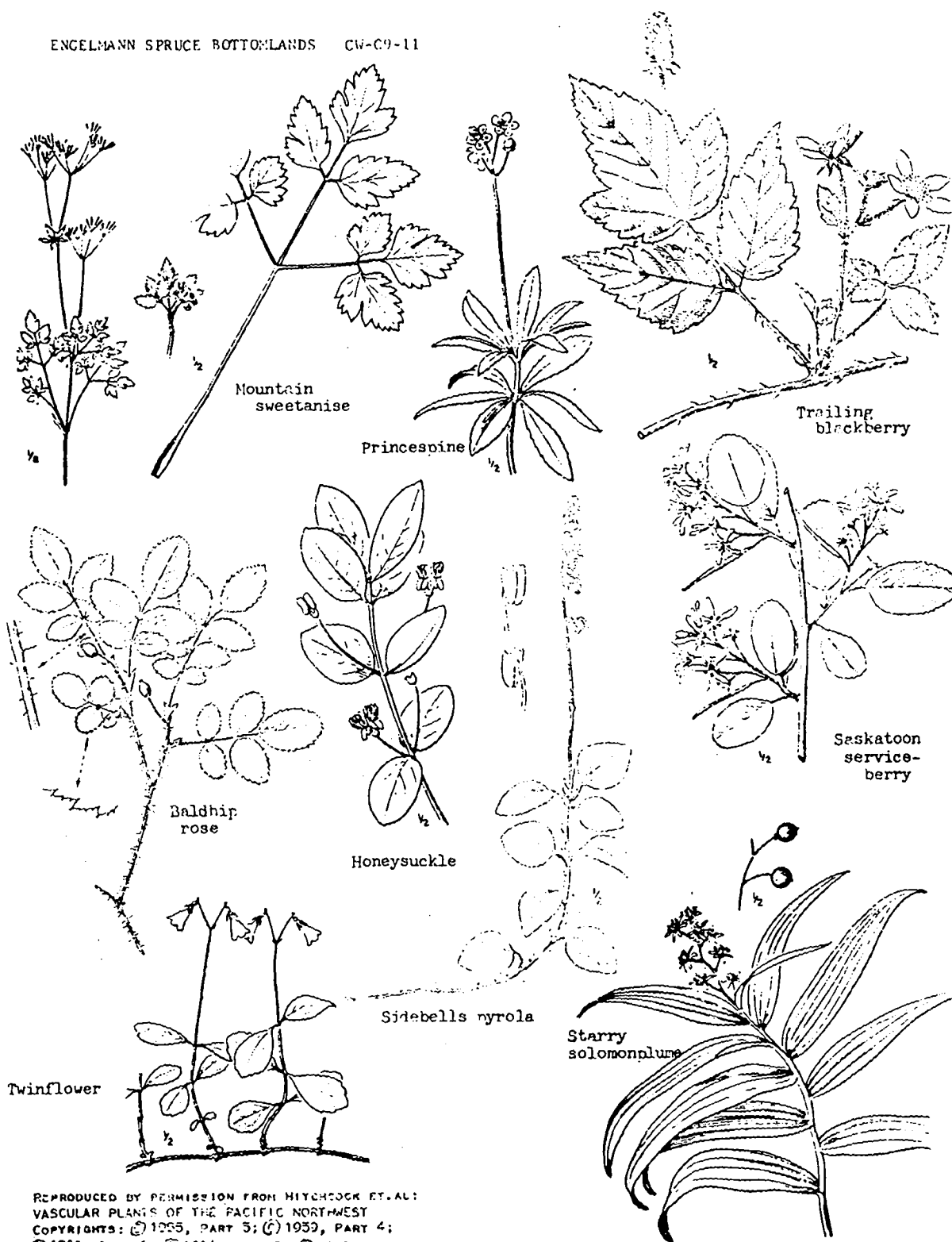
PRODUCTIVITY

(6 plots)

	Site Index			GBA10		ft ³ /yr Index	
	(PP)	(DF)*	TBA	(PP)	(DF)*	(PP)	(DF)*
Mean	97	121	200	186	247	101	140
Std Error	3.1	2.3	16.0	17.0	22.1	11.2	8.7
5% CI	8	6	39	44	61	29	24

* 5 plot sample





ENGELMANN SPRUCE BOTTOMLANDS

CW-S9-11

ENVIRONMENT

Location: Deschutes NF
Slope position: bottom
Aspect: north, east, south
Slope: 0-10%
Elevation: 4200-5600'
Topography: flat to interrupted convex and concave; drainages.

SOILS

Geology: air laid pumice/glacial outwash or till
Surface texture: coarse sandy loam to fine sandy loam
Al+AC depth: 9-30"
Rooting depth: 30-48"
Buried soil depth: 15-30"
Total soil depth: > 48"
Remarks: imperfectly drained soils. Water table usually within 5' of surface in mid July.

VEGETATION

Dominants	% Cover	Status
Engelmann spruce	10-50	High seral
Douglas-fir	0-30	Low seral
White fir	5-15	Climax

Ground vegetation: Ponderosa pine usually present as scattered old growth or decadents. Lodgepole subordinate but dominates following conflagration fire. White fir common as regeneration. Shrub layer highly variable; currant, honeysuckle, snowberry, rose, twinflower, serviceberry, princespine and trailing blackberry usually present. Common herbaceous species are solomonplume, sweet anise, beardless, sidebells pyrola, bedstraw, bearded melic. Successional pattern seems to be lodgepole and/or ponderosa pine: Douglas-fir: Engelmann spruce: white fir.

Revegetation: Not recommended except along road construction or landing sites. Mesic forest species as orchardgrass, hard fescue, smooth brome grass, timothy, tall fescue recommended.

Silviculture: High site productivity. Natural regeneration not difficult to establish for lodgepole pine, ponderosa pine, or Douglas-fir. More mesic species require light shelterwood. Scarification of shrubs necessary for planting. Indian paint fungus common in white fir. Trees shallow rooted and subject to windthrow. Gophers present in seral stands.

Range management: Summer-fall habitat for deer or elk. Old growth stands have very little livestock forage; use as transitory range. Raptor habitat especially near meadow fringes.

Indicators: Expect shrub dominance with full site exposure. Understory species will degenerate as tree crown closes.



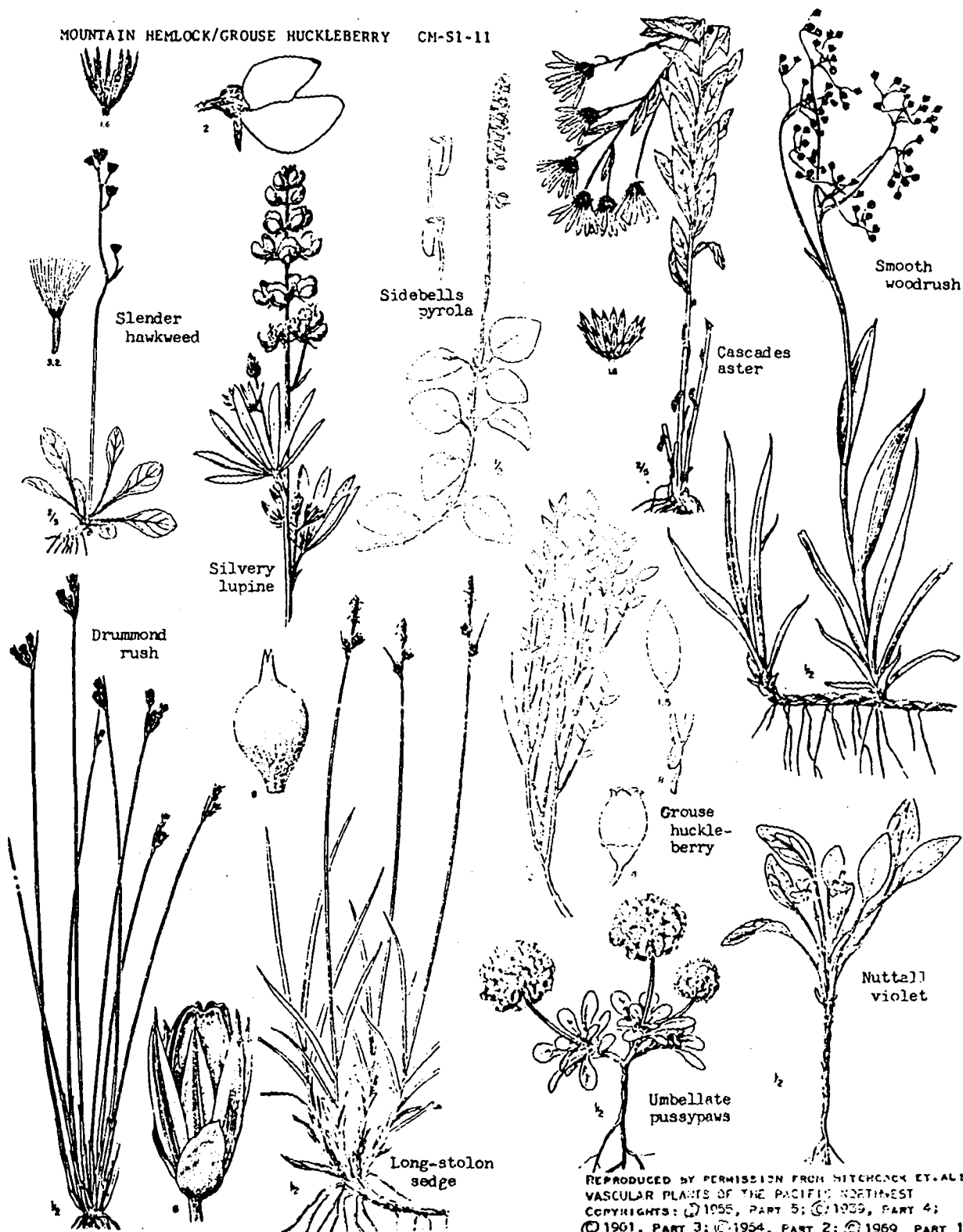
PRODUCTIVITY

(3 plots)

	Site Index				
	(ES)	(WF)	(DF)	TBA	GBA10
Mean	79	97	129	273	236
Std Error	4.5	*	9.6	21.1	8.7

* 1 plot

MOUNTAIN HEMLOCK/GROUSE HUCKLEBERRY CM-S1-11



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MOUNTAIN HEMLOCK/GROUSE HUCKLEBERRY

CMS1-11

ENVIRONMENT

Location: Deschutes, Fremont, Winema NF
 Slope position: mid to upper third
 Aspect: all exposures
 Slope: 0-35%
 Elevation: 5300-7500 ft.
 Topography: convex, flat; escarpments,
 elevated plateaus, mountain ridges
 and sideslopes.

SOILS

Geology: coarse to ash pumice over glacial till,
 basalt and andesite.
 Surface texture: coarse sand, loamy sand to loams
 Al+AC depth: 6-20"
 Rooting depth: 20-48"
 Buried soil depth: 5-23"
 Total soil depth: 22-65"
 Soil classification:
 Remarks: pumice 2-30mm particle size. A thin A2 horizon
 may be present. Litter layer compacted. Surface
 soil resists wetting. Soils very rocky south of
 Crater Lake National Park.

VEGETATION

Dominants	% Cover	Constancy	Status
Mountain hemlock	30-70	100	Major climax
Shasta red fir	0-10	40	Minor climax
Lodgepole pine	0-5	30	Seral
Grouse huckleberry	2-10(50)	100	Decreaser
Prince's pine	0-5	30	Decreaser
Long-stolon sedge	0-5	86	Increaser

Ground Vegetation: Pinemat manzanita common on or near
 rock outcrops. Mountain heath in vicinity of imperfectly
 drained soils and ephemeral pools. Drummond rush as
 localized colonies, highly discontinuous. Forb layer
 poorly represented; more open microsites have silvery
 lupine, cascades aster, slender hawkweed, sidebells
 pyrola, Nuttall violet, sweet anise and umbellate
 pussypaws. Stands with very shallow or highly
 incorporated pumice ash are richer to prince's pine, side-
 bells pyrola, bleedingheart, rattlesnake plantain and lack
 in woodrush.

Revegetation: Very difficult due to severe microclimates
 and coarse pumice soils. Trials of orchardgrass, alpine
 timothy and hard fescue are suggested.

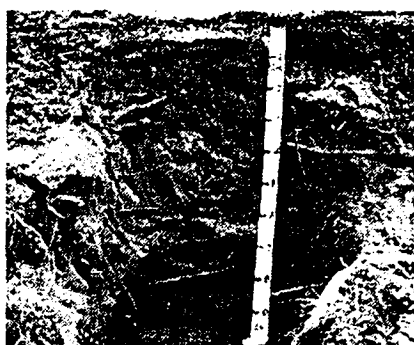
Silviculture: Whitebark pine, subalpine fir, western
 white pine or Shasta red fir often present in small
 amounts. Low site productivity attributed to both slow
 height growth and basal area increment. Stands along
 Cascade crest have higher standing and growth basal areas
 than further east. Natural regeneration either lacking or
 strongly aggregated. Planting success may be marginal due
 to pumice particle size, deposit thickness, shallowness of
 AC horizon or microclimate effects on regeneration. Heavy
 overstory removal or intense burns revert to lodgepole
 pine dominance. Gophers restricted to herbaceous openings
 and may become problem with increase in food supply after
 logging. Indian paint fungus common on hemlock. Western
 gall rust and dwarfmistletoe prevalent on older lodgepole
 pine.

Range and Wildlife Mgt: Nonrange for livestock due to low
 forage production. Summer range for mule deer.

Indicators: Woodrush and long-stolon sedge increase after
 soil scarification. Grouse huckleberry decreases with
 tree canopy closure. Pinemat manzanita associated with
 shallow, rocky soils or outcrops. Concave microrelief,
 recent crown fire or soil scarification leads to lodgepole
 pine codominance.

PRODUCTIVITY

	SI (Mh)	TBA	GBA10 (Mh)	ft. ³ /yr Index
Mean	73	313	162	68
Std Error	3.0	19.9	17.6	9.4
5% CI	6	39	34	18
No. Plots	16	16	16	16



APPENDIX

Productivity Data Summary

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Forested Types

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SUMMARY OF PRODUCTION DATA: NON-FOREST TYPES

Characteristic	1/ Herbage (lb/acre)				2/ Surface Rock (%)				3/ Bareground + Pavement (%)				4/ Moss (%)				5/ Total Plant Hits			
	N	Mean	E.O5	Range	N	Mean	E.O5	Range	N	Mean	E.O5	Range	N	Mean	E.O5	Range	N	Mean	E.O5	Range
Plant Community																				
Wet meadow	5	2456	1218	1430-3570	5	0			5	1	*	0-.1	5	9	*	.5-24	5	32.8	18	18-55
Moist (hairgrass) meadow (MW)																				
Moist (hairgrass) meadow (MW-19)	7	1947	525	1010-2553	7	0			7	7	*	0-25	7	16	*	0-38	7	26.0	6	20-37
Moist (bluegrass) meadow (MW-90)	6	2009	420	1550-2640	6	0			6	6	3	2-9	6	6.5	5.9	2-16	6	34.3	7	28-45
Dry meadow (MD-19-11)	5	1333	1180	550-2840	4	0			4	2	*	0-4.5	4	9	6	5-13	4	35.0	15	32-48
Bluegrass scabland (CB-99)	4	70	28	50-92	4	20	*	2-46	4	22	*	10-42	4	11	5	6-14				
Low sagebrush/fescue (SD-19-12)	4	179	*	54-163	5	11	9	2-18	5	42	13	27-51	5	5	*	3-11				
Big sagebrush/bunchgrass (SD-29-12)	4	244	127	142-324	4	12	12	5-22	4	42	15	28-51	4	4	*	0-11				
Big sagebrush/needlegrass rhyolite (SD-29-14)					(NO DATA AVAILABLE)															
Big sagebrush-bitterbrush/bunchgrass (SD-29-13)	5	200	93	107-285	5	9	*	3-11	5	32	17	19-51	5	3.2	*	5-7.5				
Bitterbrush/needlegrass-sedge (SD-33-11)	5	112	83	34-210	5	1	.7	.5-1.8	5	63	10	49-69	5	0						
Buckwheat flacc rhyolite (SD-91-23)					(NO DATA AVAILABLE)															
Juniper/bitterbrush bunchgrass (CJ-53-11)	4	240	57	200-287	4	19	18	1-30	4	39	16	25-50	4	1	*	0-50				

1/ Herbage is all above ground herbaceous plant materials in lb/acre air dry weight; no proper use factors have been applied.

2/ N is the number of plots in the sample. Sample size is used to compute standard error and confidence intervals other than 5%.

3/ E.O5 is the 95% (or 5%) confidence interval (19 out of 20 samples lying between + E.O5 assuming a normal distribution).

4/ Range is the experienced variation in sample plot data.

5/ Bareground + Pavement is all surface material less than or equal to .75 inch diameter. In the pumice zone pavement resulting from accelerated erosion can not be discerned from natural occurring pavement.

6/ Total Plant Hits are the average number of times a perennial plant occurred with .75 inch loop placed 100 times along a linear transect with loop frequency sampling method.

* Data is too variable for sample size to provide a reasonable estimate.

SUMMARY OF PRODUCTIVITY DATA: FORESTED TYPES

SUMMARY OF PRODUCTIVITY DATA: FORESTED TYPES

Characteristic	1/ Herbage				5/ Site Index				Total Basal Area				6/ Growth Basal Area				7/ Productivity Index (ft ³ /A/yr)				
	2/ N	Mean	E.O5	Range	3/ N	SPP	Mean	E.O5	Range	4/ N	Mean	E.O5	Range	5/ N	Mean	E.O5	Range	6/ N	Mean	E.O5	Range
Plant Community																					
Lodgepole/sedge-grass wetland (CL-M1-11)	4	1225	415	950-1630	5	LP	84	10	76-93	5	143	66	93-223	5	109	43	84-173	5	66	35	48-113
Lodgepole/blueberry/forb wetland (CL-M3-11)	5	105	61	78-600	12	LP	78	5	62-90	12	150	19	90-190	12	98	17	58-146	12	54	12	30-91
Lodgepole/bearberry (CL-M2-11)	4	33	*	10-66	9	LP	79	5	69-86	8	120	24	80-160	8	74	23	24-104	8	42	14	12-56
Lodgepole/bitterbrush/forb (CL-S2-13)	6	24	20	2-49	13	LP	71	5	64-82	13	112	14	72-156	13	68	8	44-87	13	34	4	19-44
Lodgepole/sagebrush/fescue (CL-S1-11)	(NO DATA AVAILABLE)																				
Lodgepole/bitterbrush/fescue (CL-S2-14)	12	75	20	19-137	19	LP	75	3	65-83	19	115	10	88-160	19	83	9	51-133	19	43	3	27-66
Lodgepole/bitterbrush/needlegrass (CL-S2-11)	15	11	5	2-32	30	LP	76	3	64-92	31	112	7	78-153	31	63	6	32-98	28	35	4	17-59
Lodgepole/currant-bitterbrush/needlegrass (CL-S2-15)					5	LP	67	6	63-75		124	32	94-156		60	18	50-100		33	15	22-52
Lodgepole/needlegrass basins (CL-G3-11)	13	12	5	1-31	24	LP	62	5	47-82	24	81	10	43-112	24	44	9	18-85	24	20	5	6-37
Lodgepole/sedge-needlegrass basins (CL-G4-13)					2	LP	61	*	55-67	2	78	*	70-85	2	32	*	29-34	2	13	*	13
Lodgepole/bitterbrush/sedge (CL-S2-12)	5	16	5	10-21	5	LP	85	7	77-91	5	146	52	98-203	5	107	32	50-130	5	57	23	28-79

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3/ E.O5 is the 95% (or 5%) confidence interval (19 out of 20 samples lying between \pm E.O5 assuming a normal distribution).

4/ Range is the experienced variation in sample plot size.

5/ Site index values are based on age 100 for all species. PP = ponderosa pine, WF = white fir, DF = Douglas-fir, LP = lodgepole pine.

ES = Engelmann spruce, MH = mountain hemlock, SRF = shasta red fir.

6/ Growth basal area is that basal area at which crop trees grow at 15 rpi diameter increment.

7/ Productivity index is calculated as $SI/10 * GBA/10 * .7$ for ponderosa and lodgepole pine and $.00375 (SI * GBA) + 51.6$ for Douglas-fir.

The Productivity Index is based upon optimum stand management and should only be used as a relative index between communities listed.

* Data is too variable for sample size to provide a reasonable estimate.

SUMMARY OF PRODUCTIVITY DATA: FORESTED TYPES

Characteristic	1/ Herbage				5/ Site Index					Total Basal Area				6/ Growth Basal Area				7/ Productivity Index (ft ³ /A/yr)			
	N	Mean	E.05	Range	N	SPP	Mean	E.05	Range	N	Mean	E.05	Range	N	Mean	E.05	Range	N	Mean	E.05	Range
Plant Community Lodgepole/sedge-lupine (CL-G4-11)	6	137	118	25-337	8	LP	81	7	70-96	8	196	37	119-247	8	119	26	86-196	8	74	24	42-109
Lodgepole/sedge-lupine- penstemon (CL-G4-12)					6	LP	83	3	80-88	6	213	35	115-165	6	134	19	159-253	6	78	11	70-96
Lodgepole/needlegrass- lupine (CL-G3-14)					7	LP	70	12	58-89	8	130	17	100-153	6	69	20	37-85	6	35	12	17-46
Lodgepole/needlegrass- lupine-linanthastrum (CL-G3-13)	3	73	*	18-109	7	LP	75	10	59-85	7	159	43	113-245	7	82	17	54-105	7	43	11	25-61
Lodgepole/sagebrush (rhyolite) (CL-S1-12)					2	LP	68	*	64-71	5	57	*	20-85	2	54	*	19-70	2	28	*	17-35
Lodgepole/bitterbrush (rhyolite) (CL-S2-16)					2	LP	60	*	58-61	5	110	24	90-130	2	72	*	62-82	2	30	*	26-34
Lodgepole/grouse huckle- berry (CL-S4-16)					5	LP	75	17	55-89	5	161	31	116-192	4	82	30	64-108	4	46	25	31-67
Lodgepole/manzanita (CL-S3-11)					15	LP	51	4	41-67	12	109	24	46-180	12	36	7	23-59	12	14	3	7-26
Lodgepole/snowbrush- manzanita (CL-S9-11)					10	LP	73	9	55-90	10	133	27	72-203	9	71	27	35-126	9	38	17	14-79
Lodgepole/beargrass (CL-M4-11)					3	LP	93	3	92-94	3	180	*	150-210	3	126	37	109-136	3	82	*	71-88

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4/ Range is the experienced variation in sample plot size.

5/ Site index values are based on age 100 for all species. PP = ponderosa pine, WP = white fir, DF = Douglas-fir, LP = lodgepole pine, ES = Engelmann spruce, MH = mountain hemlock, SRP = shasta red fir.

6/ Growth basal area is that basal area at which crop trees grow at 15 rpi increment.

7/ Productivity index is calculated as $SI/10 * GBA/10 * .7$ for ponderosa and lodgepole pine and $.00375 (SI * GBA) + 51.6$ for Douglas-fir. The Productivity index is based upon optimum stand management and should only be used as a relative index between communities listed.

* Data is too variable for sample size to provide a reasonable estimate.

SUMMARY OF PRODUCTIVITY DATA: FORESTED TYPES

Characteristic	1/ Herbage				5/ Site Index					Total Basal Area				6/ Growth Basal Area				7/ Productivity Index (Ect ³ /A/yr)			
	2/ N	Mean	E.05	3/ Range	4/ N	SPP	Mean	E.05	Range	N	Mean	E.05	Range	N	Mean	E.05	Range	N	Mean	E.05	Range
Ponderosa pine/bitterbrush-sagebrush/fescue (CP-S1-11)	6	217	65	145-336	6	PP	65	10	53-76	6	73	26	40-95	6	59	20	35-79	6	26	9	17-37
Ponderosa pine/bitterbrush-bunchgrass (CP-S2-16)	8	194	84	70-345	8	PP	72	6	63-85	8	74	20	39-103	8	55	18	25-76	8	28	11	13-49
Ponderosa pine/bitterbrush-fescue (CP-S2-11)	43	121	19	22-350	43	PP	76	3	62-98	43	125	12	55-245	41	79	6	23-134	41	42	4	15-89
Ponderosa pine/bitterbrush-manzanita/fescue (CP-S2-17)	14	93	26	41-183	14	PP	71	3	63-81	14	125	20	95-174	13	80	18	38-136	13	40	9	25-63
Ponderosa pine/bitterbrush-snowbrush/fescue (CP-S3-14)	5	71	11	60-85	5	PP	84	4	79-86	5	150	27	114-168	5	94	16	82-114	5	55	7	49-63
Ponderosa pine/bitterbrush-needlegrass (CP-S2-12)	31	27	10	3-150	31	PP	80	2	69-99	31	110	9	65-178	31	70	10	40-151	31	39	6	20-105
Ponderosa pine/bitterbrush-manzanita/needlegrass (CP-S2-13)	17	28	15	1-95	17	PP	76	4	66-93	17	106	10	65-140	16	62	10	34-98	16	33	6	17-52
Ponderosa pine/bitterbrush-snowbrush/needlegrass (CP-S3-11)	15	10	5	1-32	15	PP	81	5	65-95	15	138	22	100-205	14	92	15	55-144	14	53	10	33-83
Ponderosa pine/bitterbrush-sedge (CP-S2-15)	10	51	20	2-93	10	PP	83	2	79-87	10	118	21	82-180	10	65	15	32-92	10	38	9	19-54
Ponderosa pine/bitterbrush-manzanita/sedge (CP-S2-14)	3	50	*	29-82	3	PP	82	15	77-88	7	104	25	65-125	3	42	39	20-62	3	23	*	11-38
Ponderosa pine/bitterbrush-snowbrush/sedge (CP-S3-12)	6	52	27	10-82	7	PP	83	5	72-88	7	116	19	90-145	6	63	8	53-71	6	36	4	31-42
Ponderosa pine/sedge-fescue-peavine (CP-G2-12)	6	302	207	50-510	7	PP	92	7	83-101	7	189	36	158-250	6	123	38	96-195	6	79	28	60-132
Ponderosa pine/bitterbrush-squirreltail (rhyolite) (CP-S2-18)					3	PP	74	*	66-80	3	113	*	60-175	3	72	*	33-102	3	38	*	15-57
Ponderosa pine/bitterbrush-sagebrush/squirreltail (rhyolite) (CP-S1-12)	1	31	*	31	1	PP	69	*	69	4	50	*	40-80	1	36	*	36	1	17	*	17

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4/ Range is the experienced variation in sample plot data.

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ES = Engelmann spruce, MH = mountain hemlock, SRF = shasta red fir.

6/ Growth basal area is that basal area at which crop trees grow at 15 rpi diameter increment. Multiply data by 1.27 for 10/20ths (20 rpi) growth standard.

7/ Productivity index is calculated as $SI/10 * GBA/10 * .7$ for ponderosa and lodgepole pine and $.00375 (SI * GBA) + 51.6$ for Douglas-fir.

The Productivity index is based upon optimum stand management and should only be used as a relative index between communities listed.

* Data is too variable for sample size to provide a reasonable estimate.

SUMMARY OF PRODUCTIVITY DATA: FORESTED TYPES

Summary of Productivity Data: Forested Types

Characteristic	Herbage ^{1/}				Site Index ^{5/}				Total Basal Area				Growth Basal Area ^{6/}				Productivity Index ^{2/} (ft ³ /A/yr)				
	N	Mean	E.05	Range	N	SPP	Mean	E.05	Range	N	Mean	E.05	Range	N	Mean	E.05	Range	N	Mean	E.05	Range
Plant Community																					
Mixed conifer/snowbrush-manzanita (CW-S1-12)					19	PP	79	3	69-92	19	137	21	55-218	18	89	18	35-158	18	50	11	18-94
Mixed conifer/snowbrush-chinkapin (CW-H1-11)					5	PP	85	14	68-98	5	125	48	83-170	5	91	35	40-117	5	47	26	22-74
Mixed conifer/snowbrush (CW-S1-14)					7	PP	80	5	74-86	7	142	19	130-155	7	77	20	52-85	7	44	12	29-51
					6	WF	90	8	80-98												
Mixed conifer/snowbrush/sedge (CW-S1-15)	6	28	17	13-108	6	PP	83	7	73-93	6	161	29	113-190	6	97	29	50-130	6	77	25	31-84
Mixed conifer/snowbrush/sedge-brackenfern (CW-C2-13)					5	PP	81	6	76-86	5	171	33	136-197	5	95	21	77-118	5	54	12	44-65
Mixed conifer/manzanita-snowbrush/sedge-penstemon (CW-S1-13)	7	30	16	17-55	13	PP	83	5	75-107	11	222	23	160-288	11	165	18	128-207	11	97	12	76-123
Mixed conifer/manzanita (CR-S1-11)					4	SRF	62	7	58-67	5	167	46	113-204	5	96	31	59-120				
Mixed conifer/snowbrush-chinkapin/pinegrass (CW-C2-12)					7	PP	89	4	81-96	7	159	26	128-203	7	114	46	70-191	7	72	31	41-127
					3	DF	117	23	107-125	3	148	*	117-194	3	148	*	117-194	3	115	*	106-130
Mixed conifer/snowbrush-chinkapin/brackenfern (CW-C2-11)					6	PP	90	4	84-94	6	164	30	128-210	6	103	32	67-156	6	66	23	40-102
Mixed conifer/snowberry/pinegrass (CD-S6-14)					5	PP	85	8	76-95	6	177	21	151-206	5	133	43	103-164	5	80	32	61-117
					5	DF	112	12	105-127	5	127	42	87-163	5	127	42	87-163	5	106	21	95-129
					2	WF	87	20	83-92	2	170	47	159-181	2	170	47	159-181				
Mixed conifer/snowberry/forb (CD-S6-13)					3	PP	99	1	99-100	11	251	47	206-324	3	217	59	197-243	3	151	43	136-170
					10	DF	130	6	114-140	10	231	42	155-313	10	231	42	155-313	10	164	24	130-216
					6	WF	120	10	107-129	6	260	42	203-304	6	260	42	203-304				
Mixed conifer/snowberry/twinflower flatlands (CD-S6-12)					6	PP	97	8	88-109	7	200	39	148-242	6	146	34	132-206	6	101	29	69-147
					5	DF	121	6	115-126	5	194	48	129-233	5	194	48	129-233	5	140	24	109-162
Engelmann spruce bottomlands (CW-C9-11)					3	ES	79	*	72-87	3	273	*	236-309	3	186	*	172-195				
					2	DF	129		119-138												
Mountain hemlock/grouse huckleberry (CM-S1-11)					6	MH	82	10	76-97	6	307	109	117-416	5	142	73	82-210				

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^{3/} E.05 is the 95% (or 5%) confidence interval (19 out of 20 samples lying between ±E.05 assuming a normal distribution).

^{4/} Range is the experienced variation in sample plot data.

^{5/} Site index values are based on age 100 for all species. PP = ponderosa pine, WF = white fir, DF = Douglas-fir, LP = lodgepole pine, ES = Engelmann spruce, MH = mountain hemlock, SRF = Shasta red fir.

^{6/} Growth basal area is that basal area at which crop trees grow at 15 rpi diameter increment.

^{7/} Productivity index is calculated as $SI/10 \times GBA/10 \times .7$ for ponderosa and lodgepole pine and $.00375 (SI \times GBA) + 51.6$ for Douglas-fir. The Productivity index is based upon optimum stand management and should only be used as a relative index between communities listed.

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NON-FOREST TYPE

GENERAL SECTION

Plant Community	Criteria Elevation	Slope Position	Aspect	Slope %	Landform	Geology	(1)	(2)	(3)	Successional Status
							Soil Depth buried (rooting)	Soil Texture	Climate (Season, Frost heave)	
Wet meadow (MW)	4200- 6100	Bottom	All	0-1	Basins Drainage Flats	Pumice Alluvium	0-40" (24-45)	sl- sil	Moderate; heaving occasional	Climax
Moist (hairgrass) meadow (MH-19)	4200- 6100	Bottom	All	0-2	Basins Drainage Flats	Pumice Alluvium	7-76" (30-40)	lcos- sil	Moderate; heaving occasional	Climax
Moist (bluegrass) meadow (MH-90)	4200- 6100	Bottom	All	0-2.5	Drainage Basins Flats	Pumice Alluvium	25-54" (26-50)	cosl- sil	Moderate; heaving occasional	Edaphic climax unless raise water table then reverts to hairgrass meadow.
Dry meadow (MD-19-11)	4200- 6100	Bottom	All	0-2	Drainage Basins	Pumice Alluvium	30-65" (25-30)	cosl- sil	Moderate; heaving occasional	Climax
Bluegrass scabland (GB-99)	2600- 5600	Lower to Upper	All	0-10	Ridges Benches	Lava Colluvium Tuff	0-12" (12-18)	fsl- sil	Long; heaving severe	Climax due to very shallow, stoney soils
Low sagebrush/ fescue (SD-19-12)	4700- 5200	Lower to Top	All	2-5	Plateaus Ridge- lines Flats	Pumice/ Lava	7-28" (10-20)	lcos- fsl	Long; heaving common	Climax
Big sagebrush/ bunchgrass (SD-29-12)	4800- 6000	Lower to Upper	All	2-45	Plateaus Flats Escarpment	Lava Colluvium Pumice	(28-44)	cosl- sil	Long; heaving occasional	Climax, juniper increasing since fire protection
Big sagebrush/ needlegrass (rhyolite) (SD-29-14)	4800- 4900	Lower to Bottom	All	0-7	Basins Flats	Newberry pumice/ Alluvium	11-28" (17-27)	cos- ls	Long; heaving common	Climax
Big sagebrush- bitterbrush/ bunchgrass (SD-29-13)	4600- 5900	Mid to Upper	All	15-50	Butte Side- slopes	Lava Colluvium or pumice	12-30" (22-47)	ls- fsl	Long; heaving minor	Climax; fescue domin- ates northerly aspects, wheatgrass on south- erly.
Bitterbrush/ needlegrass- sedge (SD-33-11)	4400- 5400	Lower to Bottom	All	0-10	Terraces Flood- plains	Pumice & Scoria Alluvium	22-110" (30-55)	cosl- ls	Long; heaving common	Climax; an occasional lodgepole or ponderosa may be present
Buckwheat flats (rhyolite) (SD-93-23)	4800- 4900	Bottom	All	0-2	Basins Flats	Newberry Pumice/ Alluvium	20-25" (12-20)	cos	Long; heaving common	Climax
Juniper/bitter- brush/bunchgrass (CJ-53-11)	3000- 4300	Upper to Top	All (south- erly)	1-30	Plateaus Escarpment Ridges	Lava or Pumice/ Colluvium	0-9" (12-15)	cosl- l	Long; heaving minor	Climax; juniper increasing since fire protection

(1) Soil depth: Buried depth is depth to a buried profile, most soils in south central Oregon have a pumice overburden; Rooting depth is that depth to which shrubs and herbaceous plants root.

(2) Soil texture: texture given for A1 horizon only: s=sand, l=loam, si=silt, co=coarse, f=fine.

(3) Climate: growth season is the growing season for plants. Short=less than 90 days, moderate=90-120 days, long=more than 120 days. Frost heaving indicates the relative chance of frost occurring and heaving mineral soil and plants during snow free period.

NON-FOREST TYPE

RANGE AND WILDLIFE SECTION

Plant Community	Criteria	Native Understory Response to Land Management	Decreasers or Key Plants	(1)	(2)	(3)	
				Rate of Range Trend	Revegetation Potential - Species	Herbage Production Native - Browse - Seeded	
Wet meadow (MW)		Overgrazed sites become weedy and lose vegetative cover.	Slender bog sedge Chamisso sedge Tufted hairgrass	Rapid	Good; meadow foxtail Alta fescue, timothy	Very high None	Very high
Moist (hairgrass) meadow (MM-19)		Overgrazed sites to mat muhly, Kentucky bluegrass, oatgrass & weeds.	Tufted hairgrass Slender bog sedge Northern reedgrass	Moderate to rapid	Good; meadow foxtail Alta fescue, timothy, clover	Very high None	Very high
Moist (bluegrass) meadow (MM-90)		Overgrazed sites to weeds & mat muhly. Vigor of bluegrass regulated by use	Kentucky bluegrass Slender beak sedge	Moderate to rapid	Good; recommend manage for bluegrass rather than reseed	Very high None	Very high
Dry meadow (MD-19-11)		Overgrazed sites to perennial & annual weeds plus mat muhly.	Cusick bluegrass Slender wheatgrass Prairie junegrass	Moderate to slow	Good; slender wheatgrass, hard fescue	High None	High
Bluegrass scabland (CB-99)		Overgrazed sites to small fescue, annual hairgrass, hairy brome.	Sandberg bluegrass Onespike oatgrass	Slow	Poor; soils too shallow, usually very stoney to revegetate	Moderate None	Low
Low sagebrush/fescue (SD-14-12)		Rabbitbrush, cheatgrass, squirreltail increase. Increase in sagebrush.	Bluebunch wheat. Idaho fescue	Slow	Poor; soils too shallow and stoney to revegetate	High Moderate	Low
Big sagebrush/bunchgrass (SD-29-12)		Rabbitbrush, cheatgrass, goldenweed, squirreltail increase.	Bluebunch wheat. Idaho fescue Thurber needlegrass	Moderate	Fair-good; slopes too steep for machinery	High Moderate	High
Big sagebrush/needlegrass (rhyolite) (SD-29-14)		Green rabbitbrush, horsebrush and squirreltail increase.	Sulfur eriogonum Needlegrass	Slow	Fair-poor; sagebrush control necessary. Prefer crested wheatgrass	Low Moderate	Low
Big sagebrush-bitterbrush/bunchgrass (SD-29-13)		Cheatgrass & rabbitbrush increase with burning or overgrazing.	Bitterbrush Idaho fescue Bluebunch wheat.	Moderate	Fair to good; wheatgrasses. Slopes restrict machinery	High High	High
Bitterbrush/needlegrass-sedge (SD-33-11)		Increase in sedge, gray rabbitbrush, goldenweed.	Bitterbrush Sulfur eriogonum Long-stolon sedge	Moderate to slow	Poor; not recommended due to deep sandy soils	Moderate Moderate	Low
Buckwheat flats (rhyolite) (SD-93-23)		Unsuitable for livestock horsebrush increases with overgrazing.	Sulfur eriogonum Thurber & western needlegrass	Slow	Poor; not recommended due to soils & microclimate	Low Low	Low
Juniper/bitterbrush/bunchgrass (CJ-53-11)		Rabbitbrush, cheatgrass increase. Eriogonum & bitterbrush decrease.	Bitterbrush Idaho fescue Bluebunch wheat.	Moderate	Poor; soils too shallow & stoney for revegetation	High High	High

- (1) Rate of Range Trend: time necessary to double density of herbaceous vegetation without livestock use and severe soil disturbance as accompanies logging: slow = 10 years or more; moderate = 5-10 years; rapid = less than 5 years.
- (2) Revegetation: potential is the relative success that a site can be revegetated assuming an optimum technique is employed. Poor = maximum crown cover of seeded species does not exceed 30%. Fair = 30-60% crown cover potential. Good = greater than 60% crown cover. Most recommended species are given or reasons for poor performance.
- (3) Herbage Production: is 50% of the total, palatable forage produced under good range condition or managed timber crown cover conditions. Low = less than 50 lbs/acre. Moderate = 50-150 lbs/acre. High = 150-300 lbs/acre. Very high = greater than 300 lbs/acre.

NON-FOREST TYPE
RANGE AND WILDLIFE SECTION (Cont.)

Plant Community	Criteria	(1) Pocket Gopher Risk	Wildlife	Special Considerations
Wet Meadow	(MW)	Low	Raptorial bird food supply	Range readiness delayed to midsummer by wet soils.
Moist (hairgrass) meadow	(MM-19)	Moderate	Raptorial bird food supply; crane nesting	Range readiness delayed by wet, cold soils.
Moist (bluegrass) meadow	(MM-90)	Moderate	Raptorial bird food supply; crane nesting	Growth form of bluegrass changes with livestock management.
Dry meadow	(MD-19-11)	Moderate to low	Raptorial bird food supply	Most sensitive to overgrazing.
Bluegrass scrubland	(GB-99)	Moderate to low	Forage source on winter-spring deer range	Very sensitive to overgrazing. Soils saturated in spring.
Low sagebrush/fescue	(SD-19-12)	Low	Deer winter range, antelope	Very sensitive to overgrazing. Soils saturated in spring.
Big sagebrush/bunchgrass	(SD-29-12)	Low	Deer winter range, antelope	Recently burned stands dominated by bunchgrass or cheatgrass & rabbitbrush.
Big sagebrush/needlegrass (rhyolite)	(SD-29-14)	Low	Winter deer range, antelope	Site potential for revegetation much lower than on soils from basic parent material.
Big sagebrush-bitterbrush/bunchgrass	(SD-29-13)	Low	Deer winter range; antelope; raptorial bird nesting	Burned sites to bunchgrass dominance. Juniper may invade.
Bitterbrush/needlegrass-sedge	(SD-33-11)	Low to Moderate	Summer deer range (forage); raptorial birds	Sensitive to overgrazing by sheep
Buckwheat flats (rhyolite)	(SD-93-23)	Very high	Raptorial bird food supply; antelope	Do not attempt forestation or revegetation.
Juniper/bitterbrush/bunchgrass	(CJ-53-11)	Low	Deer winter range; raptorial bird nesting	

(1) Pocket gopher risk is that relative chance of gophers becoming a management problem following logging and slash disposal.

FOREST TYPES

GENERAL SECTION

Plant Community	Criteria	Elevation	Slope Position	Aspect	2 Slope	Landform	(1) Soil Depth Buried (Rooting)	(2) Soil Texture	(3) Climate (Season, Frost Heave)	Successional Status
Lodgepole/sedge-grass wetlands (CL-M1-11)		4200-5700	Bottom	All	0-5	Drainages	Pumice 6-45" alluvium (25-45)	sl-sil	Mod. Short; heaving common	Lodgepole is climax; spruce, hemlock, true fir occasional.
Lodgepole/blueberry/forb wetland (CL-M3-11)		4200-5700	Bottom	All	0-3	Drainage	Pumice 0-20" alluvium (12-50)	sl-fsl	Mod. Short; heaving common	Lodgepole is climax; spruce, hemlock, true fir occasional.
Lodgepole/bearberry (CL-M2-11)		4200-5500	Lower to bottom	All	0-3	Drainage, basin	Pumice/ lava, tuff (28-42) alluvium	lcos-sl	Moderate; heaving occasional	Lodgepole is climax.
Lodgepole/bitterbrush/forb (CL-S2-13)		4200-5700	Lower to bottom	All	1-6	Drainage, basin, plateau	Pumice/ lava, tuff, alluvium	lcos-sl	Moderate; heaving occasional	Lodgepole is climax.
Lodgepole/sagebrush/fescue (CL-S1-11)		4700-4800	Lower third	All	0-8	Plateau, lava flow	Pumice/ lava, (30) alluvium	ls	Long; heaving minor	Lodgepole is climax.
Lodgepole/bitterbrush/fescue (CL-S2-14)		4200-5700	Bottom to mid third	All	0-8	Basin, drainage, terraces	Pumice/ lava (20-60)	lcos-sl	Mod. long; heaving minor	Lodgepole is climax but becomes seral to ponderosa as gain elevation.
Lodgepole/bitterbrush/needlegrass (CL-S2-11)		4200-5700	Lower to mid	All	1-12	Basins, plateaus, benches	Pumice/ lava, tuff, alluvium	lcos-ls	Moderate; heaving occasional	Lodgepole is climax or seral to ponderosa near elevated ground.
Lodgepole/currant-bitterbrush/needlegrass (CL-S2-15)		5700-6600	Lower to mid	West, south, east	2-15	Buttes, ridges	Pumice/ lava, (15-40) colluvium	lcos-cosl	Moderate to short; heaving occasional	Lodgepole climax on flatter topography, seral to white fir or ponderosa elsewhere
Lodgepole/needlegrass basins (CL-G3-11)		4600-5700	Lower to bottom	All	0-5	Basins, benches, flats	Pumice/ colluvium (20-48) or alluvium	cos-ls	Moderate; heaving severe	Lodgepole is climax.
Lodgepole/sedge-needlegrass basins (CL-G4-13)		5300-6300	Lower third	South-east, north	0-5	Basins, plateaus	Pumice/ (< 36") alluvium	ls	Short; heaving pronounced	Lodgepole is climax.
Lodgepole/bitterbrush/sedge (CL-S2-12)		4500-5400	Lower to mid third	North, east, south	0-40	Basins, benches, plateaus	Pumice 27-40" or scoria (36-48) flow	lcos-sl	Moderate; heaving localized	Lodgepole climax, or seral to ponderosa or true fir near elevated topography.

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- (2) Soil texture: texture given for A1 horizon only; s = sand, l = loam, sl = silt, co = coarse, f = fine.
- (3) Climate: growth season is the growing season for plants. Short = less than 90 days, moderate = 90-120 days, long = more than 120 days. Frost heaving indicates the relative chance of frost occurring and heaving mineral soil and plants during snow free period.

FOREST TYPES

GENERAL SECTION (Cont.)

GENERAL SECTION (Cont.)							(1)	(2)	(3)	
Plant Community	Criteria	Elevation	Slope Position	Aspect	% Slope	Landform	Soil Depth Buried (Rooting)	Soil Texture	Climate (Season, Frost Heave)	Successional Status
Lodgepole/sedge-lupine		5400-6500	Lower to upper	East, south, south-west	1-26	Plateaus, basins, terraces	Pumice, 0-45" (25-50)	ls-cos	Moderate to short; heaving common	Lodgepole climax or seral to true fir & hemlock. Depends on landform.
(CL-G4-11)										
Lodgepole/sedge-lupine-penstemon		5000-5800	Mid to upper	All	4-26	Plateau, escarpment benches	Pumice/ till, 14-32" (27-36)	lcos-ls	Short; heaving common	Lodgepole as fire climax or seral to ponderosa or true fir.
(CL-G4-12)										
Lodgepole/needle-grass-lupine		5900-8100	Upper	All	1-25	Mountain slopes & basins	Pumice/ cinders, 16-45" (17-45)	lcos-lfs	Short; heaving common	Lodgepole as climax, mt. hemlock occasional.
(CL-G3-14)										
Lodgepole/needle-grass-lupine-linanthastrum		5600-7100	Mid to upper	All	0-30	Basins, buttes	Fine pumice/ lava colluvium, 28-58" (30-56)	lcos-ls	Moderate; minor heaving	Lodgepole is climax; ponderosa, white fir, hemlock occasional.
(CL-G3-13)										
Lodgepole/sagebrush (rhyolite)		4800-4900	Mid to lower	All	0-8	Basalt flows	Newberry pumice/ lava, 13-24" (20-60)	lcos-s	Long; locally common heaving	Lodgepole is climax; can be seral to ponderosa on convex.
(CL-S1-12)										
Lodgepole/bitterbrush (rhyolite)		4800-5300	Mid third	All	0-15	Recent lava flows butte toes	Newberry pumice/ Mazama pumice, 9-36" (20-60)	cos-lcos	Long; minor heaving	Lodgepole climax in basins and swales, seral to ponderosa on convex.
(CL-S2-16)										
Lodgepole/beargrass		4800-5500	Lower to upper	All	5-40	Basins, mountain slopes	Volcanic Unknown or pumice (36-50) ash/till	ls-fsl	Short; heaving common	Lodgepole seral to mt. hemlock and sub-alpine fir.
(CL-M4-11)										
Lodgepole/snow-brush-manzanita		4800-6000	Lower to upper	All	2-15	Bench, plateaus	Pumice/ lava colluvium, 26- >100" (25-40)	ls-lcos	Moderate; heaving minor	Lodgepole pine is seral to ponderosa or white fir.
(CL-S9-11)										
Lodgepole/manzanita		5800-7000	Mid to upper	East, south, west	2-30	Ridges, escarpment	Pumice/ lava colluvium, 0-30" (20-30)	lcos	Short; heaving common	Lodgepole climax or seral to true fir depending on topographic position.
(CL-S3-11)										
Lodgepole/grouse huckleberry		5100-6400	Lower to mid	All	5-45	Basins, escarpment ridges	Pumice/ pumice or lava, 18-40" (25-40)	lcos-fsl	Short; heaving common	Lodgepole climax or seral to mt. hemlock depending on topography.
(CL-S4-16)										

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(3) Climate: growth season is the growing season for plants. Short = less than 90 days, moderate = 90-120 days, long = more than 120 days. Frost heaving indicates the relative chance of frost occurring and heaving mineral soil and plants during snow free period.

FOREST TYPES

GENERAL SECTION (Cont.)

Plant Community	Criteria	Elevation	Slope Position	Aspect	Slope %	Landform	Geology	(1)	(2)	(3)	Successional Status
								Soil Depth Buried (Rooting)	Soil Texture	Climate Season, Frost Heave	
Ponderosa/bitter-brush-sagebrush/fescue (CP-S1-11)		4590-6100'	Lower to upper	West, south, east	1-55	Buttes, plateaus	Pumice/lava, outwash	10-40" (30-60)	cosl-1	Long; minor heaving	Climax ponderosa. Juniper invades with fire protection.
Ponderosa/bitter-brush/bunchgrass (CP-S2-16)		2900-5400'	Lower to upper	All (south)	5-40	Butte & escarpments	Pumice/lava, cinders	4-25" (25-55)	gl-fsl	Long; minor heaving	Climax ponderosa; northerly aspect w/ Douglas-fir climax.
Ponderosa/bitter-brush/fescue (CP-S2-11)		2550-5600'	Lower to mid	All	6-30 (45)	Outwash plains, plateaus	Pumice/lava or pumice	6-28" (15-60)	lcos-fsl	Moderate; locally common	Climax ponderosa; lodgepole seral.
Ponderosa/bitter-brush-manzanita/fescue (CP-S2-17)		3100-5800'	Lower to upper	All	2-30	Terraces, buttes, plateau	Pumice/lava, cinders	10-24" (18-45)	cosl-fsl	Long; minor heaving	Climax ponderosa; Juniper and incense cedar seral.
Ponderosa/bitter-brush-snowbrush/fescue (CP-S3-14)		3250-4100'	Mid third	North-west to east	3-6	Outwash plains, plateaus	Pumice, sand/till lava	12-26" (35-70)	cosl-lfs	Long; minor heaving	Ponderosa is fire climax but seral to white fir with protection.
Ponderosa/bitter-brush/needlegrass (CP-S2-12)		2850-5600'	Lower to upper	All	1-50	Plateau benches, escarpment	Pumice/lava or outwash	12->100" (15-65)	lcos-sl	Long; minor heaving	Ponderosa climax, lodgepole seral with fire or soil disturbance.
Ponderosa/bitter-brush-manzanita/needlegrass (CP-S2-13)		3000-5900'	Mid to upper	All	5-40	Plateau escarpment, buttes	Pumice/colluvium, cinders	12->100" (24-60)	lcos	Long; minor heaving	Ponderosa climax on xeric, white fir on mesic, lodgepole is seral.
Ponderosa/bitter-brush-snowbrush/needlegrass (CP-S3-11)		4300-5800'	Lower to upper	All	1-20	Buttes, plateau escarpment	Pumice/colluvium, tuff	14->100" (18-70)	lcos-cosl	Long; minor heaving	Ponderosa climax with lodgepole seral following burning or logging.
Ponderosa/bitter-brush/sedge (CP-S2-15)		4900-5900'	Lower to mid	All	1-10 (19)	Plateaus, outwash plains	Pumice/pumice	20->100" (20-55)	lcos-sl	Moderate; locally common	Climax ponderosa; lodgepole seral.
Ponderosa/bitter-brush-manzanita/sedge (CP-S2-16)		5200-5600'	Mid third	East-south	2-12	Plateau, outwash	Basic scoria flow	30->100" (35-65)	sl-lcos	Moderate; minor heaving	Climax ponderosa; lodgepole seral.
Ponderosa/bitter-brush-snowbrush/sedge (CP-S3-12)		4500-5000'	Lower to mid	All	2-10	Outwash plains, escarpment, toe	Pumice or scoria flow	15->100" (36-65)	lcos-fsl	Moderate; minor heaving	Climax ponderosa; lodgepole seral.
Ponderosa/sedge-fescue-peavine (CP-G2-12)		3800-4800'	Lower to mid	All	0-40	Outwash plain	Pumice, volcanic sand/till	19-34" (31-48)	ls-fsl	Moderate; minor heaving	Climax white fir; ponderosa high seral.
Ponderosa/bitter-brush/squirrel-tail (rhyolite) (CP-S2-18)		4850-5100'	Lower to mid	All	4-25	Plateau	Newberry pumice/lava	12-34" (50-70)	cos-ls	Long; minor heaving	Climax ponderosa; climax lodgepole in swales.
Ponderosa/bitter-brush-sagebrush/squirrel-tail (rhyolite) (CP-S1-12)		4800-5100'	Mid	All	0-6	Plateau	Newberry pumice/lava	12-20" (36-65)	s-ls	Long; minor heaving	Climax ponderosa; pine savanna along desert fringe.

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FOREST TYPES

GENERAL SECTION
(Cont.)

Plant Community	Criteria	Elevation	Slope Position	Aspect	Z Slope	Landform	Geology	(1) Soil Depth Buried (Rooting)	(2) Soil Texture	(3) Climate (Season, Frost Heave)	Successional Status
Mixed conifer/snow- brush-manzanita (CW-S1-17)		4100- 5850'	Mid to upper	All	5-50	Buttes, escarpm't plateaus	Pumice/ cinders, lava, tuff	10-60" (15-75)	cos- lcos	Moderate; minor heaving	Ponderosa climax south aspect, white fir climax on north; lodgepole seral.
Mixed conifer/snow- brush-chinkapin (CW-H1-11)		4500- 5900'	Mid to upper	West, north, east	15-60	Escarpm't buttes	Pumice/ lava • colluvium	65" (21-50)	lcos- fsl	Moderate; minor heaving	White fir & Douglas- fir climax, pines are seral.
Mixed conifer/snow- brush (CW-S1-14)		5400- 6100'	Mid to top	All	10-25	Plateaus, buttes, ridges	Pumice/ lava colluvium	18-30(75) (25-42)	lcos	Mod.Short; minor heaving	White fir as climax, ponderosa high seral, lodgepole low seral.
Mixed conifer/snow- brush/sedge (CW-S1-15)		5000- 5900'	Mid to upper	All	2-30	Outwash plains, escarpm't butte toes	Pumice/ lava flow	15-50" (40-72)	lcos- ls	Moderate; minor heaving	White fir climax, ponderosa minor cli- max or seral with lodgepole.
Mixed conifer/snow- brush/sedge- brackenfern (CW-C2-13)		3500- 4500'	Lower to upper	All	1-45	Toe slopes of buttes, escarpm't outwash plain	Scoria pumice/ cinders, till, colluvium	12-24" (26-60)	ls- lfs	Moderate; minor heaving	White fir & Douglas- fir climax, ponderosa seral.
Mixed conifer/man- zanita-snowbrush/ sedge-pentstemon (CW-S1-13)		4300- 5600'	Lower to upper	East, north, north- west	2-60	Ridge- lines, buttes, escarpm't	Pumice ash/till, lava	10-65" (25-50)	lcos- sl	Short; minor heaving	Ponderosa and lodge- pole seral to white fir.
Mixed conifer/man- zanita (CW-S1-11)		5450- 7000'	Mid to upper	All	5-30	Escarpm't ridges, buttes	Pumice/ lava or cinders	unknown	lcos- ls	Mod.Short; minor heaving	White fir or Shasta fir climax; lodge- pole seral.
Mixed conifer/snow- brush-chinkapin/ pinegrass (CW-C2-12)		3300- 5000'	Lower to top	All	10-55	Buttes, escarpm't ridges	Pumice ash/lava till	13-20" (20-50)	lcos- lfs	Moderate; minor heaving	Douglas-fir & white fir climax. Ponderosa & incense cedar seral
Mixed conifer/snow- brush-chinkapin/ brackenfern (CW-C2-11)		3000- 4650'	Mid to upper	All	5-48	Buttes, ridges, outwash plain	Volcanic scoria/ lava, till	6-20" (20-45)	lcos- cosl	Moderate; minor heaving	Douglas-fir & white fir climax. Ponderosa & incense cedar seral
Mixed conifer/snow- berry/pinegrass (CD-S6-14)		3000- 4700'	Lower to upper	All (north- erly)	0-15	Escarpm't plateau ridge- lines	Volcanic ash/lava	9-23" (16-48)	lcos- cosl	Moderate; minor heaving	Douglas-fir & white fir as climax. Pon- derosa and incense cedar as seral.
Mixed conifer/snow- berry/forb (CD-S6-13)		3600- 4700'	Bottom to upper	NW N SE	1-36	Buttes, escarpm't terraces	Scoria & ash/cin- ders,till	17-38" (36-60)	lcos- lfs	Moderate; minor heaving	White fir & Douglas- fir climax, seral are ponderosa or spruce.
Mixed conifer/snow- berry/twin lower flatlands (CD-S6-12)		3000- 3500'	Lower to bottom	South, south- east, east	0-6	Undulat'g to flat; outwash plains	Pumice or sand/ till	5-30" (20-48)	glcos- fsl	Moderate; minor heaving	White fir climax; pine,larch,Douglas- fir seral.
Engelmann spruce bottomlands (CW-C9-11)		4200- 5600'	Bottom	North, east, south	0-10	Drainage	Pumice/ outwash or till	15-30" (30-48)	cosl- fsl	Short; heaving common	Engelmann spruce & white fir climax; pines & Douglas-fir seral.
Mountain hemlock/ grouse huckleberry (CW-S1-11)		5300- 6700'	Mid to upper	All	0-30	Rolling ridges, plateaus, escarpm't	Pumice/ till or lava	5-23" (22-48)	cos- ls	Short; heaving occasional	Climax mountain hem- lock; lodgepole, white pine, Shasta fir seral.

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FOREST TYPES
RANGE AND WILDLIFE SECTION

Plant Community	Criteria	Native Understory Response to Timber Mgt.	Decreasers; Key Plants	(1) Rate of Range Trend	(2) Revegetation Potential - Species	(3) Herbage Production Native-Browse Vegetation	Wildlife Consideration
Lodgepole/sedge-grass wetland (CL-M1-11)		Increase in native grasses, sedges & forbs.	Unknown (transitory range)	Rapid	Excellent; tall fescue, clover, orchardgrass, meadow foxtail	Very high none very high	Cover for mule deer in autumn, raptorial birds, grouse, bear.
Lodgepole/blueberry/forb wetland (CL-M3-11)		Increase in huckleberry, blueberry, forbs and grasses.	Unknown (transitory range)	Rapid	Excellent; tall fescue, clover, orchardgrass, meadow foxtail	Moderate moderate high	Cover for mule deer in autumn, raptorial birds, grouse, bear.
Lodgepole/bearberry (CL-M2-11)		Increase in bearberry, currant; bitterbrush decreases.	Bitterbrush (transitory range)	Moderate	Good; orchardgrass, hard fescue, tall fescue	Low low high	Cover & forage on deer summer range; fawning site. Raptors near meadows.
Lodgepole/bitterbrush/forb (CL-S2-13)		Increase in currant & goldenweed. Bitterbrush decreases.	Bitterbrush (transitory range)	Moderate	Good; hard fescue, orchardgrass, intermediate wheat	Low high high	Cover & forage on deer summer range; fawning site. Raptors near meadow.
Lodgepole/sagebrush/fescue (CL-S1-11)		Increase in sagebrush, green rabbitbrush. Bitterbrush decreases.	Bitterbrush Idaho fescue	Slow	Fair; wheatgrass, hard fescue	Moderate moderate high	Spring-fall mule deer range; antelope.
Lodgepole/bitterbrush/fescue (CL-S2-14)		Goldenweed & squaw currant increase; bitterbrush decreases.	Bitterbrush Idaho fescue	Moderate to slow	Fair; hard fescue orchardgrass smooth brome	Moderate moderate high	Spring-fall mule deer range; antelope occasional
Lodgepole/bitterbrush/needlegrass (CL-S2-11)		Decrease in bitterbrush; increase in currant, goldenweed, squirreltail.	Bitterbrush	Moderate	Fair; intermediate wheatgrass	Low high moderate	Important cover & forage for mule deer.
Lodgepole/currant-bitterbrush/needlegrass (CL-S2-15)		Currant, goldenweed, needlegrass increase. Bitterbrush decreases.	Bitterbrush (transitory range)	Moderate to slow	Poor; not recommended due to severe microclimates	Low moderate low	Summer mule deer range for cover and forage.
Lodgepole/needlegrass basins (CL-G3-11)		Increase in squirreltail, needlegrass and squaw currant.	Bitterbrush (transitory range)	Slow	Poor; not recommended due to severe microclimate	Low low low	Minor source of summer deer forage.
Lodgepole/sedge-needlegrass basins (CL-G4-13)		Increase in long-stolon sedge, squirreltail, needlegrass.	No decrease (Nonrange)	Slow	Poor; not recommended due to severe microclimates	Low low low	Minor source of summer deer forage.
Lodgepole/bitterbrush/sedge (CL-S2-12)		Long-stolon sedge, currant, goldenweed increase. Bitterbrush decreases.	Bitterbrush, long-stolon sedge (transitory range)	Moderate	Fair; mountain brome orchardgrass, intermediate wheat	low high moderate	Forage & cover for summer mule deer range.

- (1) Rate of Range Trend: time necessary to double density of herbaceous vegetation without livestock use and severe soil disturbance as accompanies logging: slow = 10 years or more; moderate = 5-10 years; rapid = less than 5 years.
- (2) Revegetation: potential is the relative success that a site can be revegetated assuming an optimum technique is employed. Poor = maximum crown cover of seeded species doesn't exceed 30%. Fair = 30-60% crown cover potential. Good = greater than 60% crown cover. Most recommended species are given or reasons for poor performance.
- (3) Herbage Production: is 50% of the total, palatable forage produced under good range condition or managed timber crown cover conditions. Low = less than 50 lbs/acre. Moderate = 50-150 lbs/acre. High = 150-300 lbs/acre. Very high = greater than 300 lbs/acre.

FOREST TYPES

RANGE AND WILDLIFE SECTION (Cont.)

Plant Community	Criteria	Native Understory Response to Timber Mgmt.	Decreasers; Key Plants	(1) Rate of Range Trend	(2) Revegetation: Potential - Species	(3) Herbage Production Native-Browse Revegetation	Wildlife Consideration
Lodgepole/sedge-lupine (CL-G4-11)		Increase in long-stolon sedge, lupine, currant & goldenweed.	No dec.; long-stolon sedge. (transitory range)	Moderate	Fair; hard fescue, orchardgrass, mt. brome	Moderate low moderate	Summer deer range; pine martin, occasional bear.
Lodgepole/sedge-lupine-penstemon (CL-G4-12)		Increase in long-stolon sedge, squaw currant, penstemon, needlegrass.	No dec.; long-stolon sedge. (transitory range)	Moderate	Good; smooth brome, orchardgrass, hard fescue	Moderate low high	Summer deer range.
Lodgepole/needle-grass-lupine (CL-G3-14)		Currant, goldenweed, lupine increase.	No dec.; (Nonrange)	Slow	Poor; not recommended due to severe microclimates	Moderate low low	Summer mule deer range; pine martin.
Lodgepole/needle-grass-lupine-linanthastrum (CL-G3-13)		Increase in long-stolon sedge, squirreltail, goldenweed, squaw currant.	No dec.; long-stolon sedge. (transitory range)	Moderate to slow	Good; hard fescue, intermediate wheat, mountain brome	Moderate low moderate	Deer summer range.
Lodgepole/sagebrush (rhyolite) (CL-S1-12)		Increase in sagebrush and rabbitbrush.	Bitterbrush; sulfur eriogonum	Moderate to slow	Poor; revegetation not recommended	Low moderate low	Spring-fall-winter range for deer, fawning area. Antelope.
Lodgepole/bitterbrush (rhyolite) (CL-S2-16)		Increase in Ross sedge, squirreltail, currant; bitterbrush decreases.	Bitterbrush (transitory range)	Moderate to slow	Poor; not recommended	Low moderate low	Spring-summer deer range; fawning area.
Lodgepole/beargrass (CL-M4-11)		Increase in long-stolon sedge, lupine, brackenfern, manzanita.	No dec.; long-stolon sedge. (Nonrange)	Moderate to slow	Good-fair; hard fescue, alpine timothy, orchardgrass	Low low moderate	Summer deer range; bear, pine martin.
Lodgepole/snowbrush-manzanita (CL-S9-11)		Increase in manzanita & snowbrush. Bitterbrush decreases with canopy closure.	Bitterbrush; (transitory range)	Moderate to slow	Fair; orchardgrass, smooth brome	Low moderate moderate	Cover on deer summer range.
Lodgepole/manzanita (CL-S3-11)		Increase in greenleaf & pinemat manzanita.	(Nonrange)	Slow	Poor; not recommended	Low low low	Occasionally pine martin or mule deer.
Lodgepole/grouse huckleberry (CL-S4-16)		Slight increase in currant & smooth woodrush.	(Nonrange)	Slow	Poor; not recommended	Low low low	Occasional pine martin, elk or mule deer.

- (1) Rate of Range Trend: time necessary to double density of herbaceous vegetation without livestock use and severe soil disturbance as accompanies logging: slow = 10 years or more; moderate = 5-10 years; rapid = less than 5 years.
- (2) Revegetation: potential is the relative success that a site can be revegetated assuming an optimum technique is employed. Poor = maximum crown cover of seeded species doesn't exceed 30%. Fair = 30-60% crown cover potential. Good = greater than 60% crown cover. Most recommended species are given or reasons for poor performance.
- (3) Herbage Production: is 50% of the total, palatable forage produced under good range condition or managed timber crown cover conditions. Low = less than 50 lbs/acre. Moderate = 50-150 lbs/acre. High = 150-300 lbs/acre. Very high = greater than 300 lbs/acre.

FOREST TYPES
RANGE AND WILDLIFE SECTION
(Cont.)

Plant Community	Criteria	Native Understory Response to Timber Mgt.	Decreasers: Key Plants	(1) Rate of Range Trend	(2) Revegetation Potential - Species	(3) Herbage Production Native-Browse-Revegetation	Wildlife Consideration
Ponderosa/bitterbrush-sagebrush/fescue (CP-S1-11)		Rabbitbrush increases, bitterbrush & fescue decline.	Bitterbrush, bluebunch wheat, Idaho fescue	Slow	Fair; wheatgrasses	High high high	Winter, spring-fall deer range. Antelope
Ponderosa/bitterbrush-bunchgrass (CP-S2-16)		Increase in cheatgrass & squirreltail.	Bitterbrush, bluebunch wheat, Idaho fescue	Slow	Fair; intermediate crested wheat-grass	High moderate moderate	Spring-fall winter deer range; antelope
Ponderosa/bitterbrush/fescue (CP-S2-11)		Decrease in bitterbrush, goldenweed, needlegrass & fescue increase.	Bitterbrush, Idaho fescue	Moderate	Fair; hard fescue, mountain brome, intermediate wheat	Moderate high moderate	Spring-fall deer range; raptorial birds when near meadows.
Ponderosa/bitterbrush-manzanita/fescue (CP-S2-17)		Increase in Idaho fescue & manzanita. Decrease in bitterbrush.	Bitterbrush, Idaho fescue	Moderate to slow	Fair; intermediate or crested wheat-grass, hard fescue	Moderate moderate moderate	Spring-fall deer range. Antelope along high desert
Ponderosa/bitterbrush-snowbrush/fescue (CP-S3-14)		Increase in sedge, manzanita, goldenweed. Decrease in bitterbrush.	Bitterbrush, Idaho fescue	Moderate to slow	Fair; mountain brome, hard fescue, intermediate wheat	Moderate moderate moderate	Summer mule deer range.
Ponderosa/bitterbrush/needlegrass (CP-S2-12)		Increase in needlegrass and squirreltail.	Bitterbrush	Moderate	Fair-poor; intermediate or plub- escent wheat-grass	Low high moderate	Provides major food source for mule deer on summer range.
Ponderosa/bitterbrush-manzanita/needlegrass (CP-S2-13)		Manzanita, snowbrush, needlegrass increase. Bitterbrush decreases.	Bitterbrush	Slow due to shrubs	Fair-poor; intermediate wheat-grass	Low high moderate	Meets cover & food requirement for deer summer range.
Ponderosa/bitterbrush-snowbrush/needlegrass (CP-S3-11)		Strong increase in manzanita and snowbrush, decrease in bitterbrush.	Bitterbrush	Slow due to shrubs	Fair-poor; wheat-grasses	Low moderate moderate	Deer summer range as cover, some forage.
Ponderosa/bitterbrush/sedge (CP-S2-15)		Goldenweed & sedge increase sharply.	Bitterbrush, sedge	Slow	Poor; intermediate wheatgrass, smooth brome	Moderate high low	Summer deer range
Ponderosa/bitterbrush-manzanita/sedge (CP-S2-14)		Manzanita, snowbrush & sedge increase.	Bitterbrush, sedge	Slow	Poor; intermediate plubescant wheatgrass	Moderate moderate low	Summer deer range
Ponderosa/bitterbrush-snowbrush/sedge (CP-S3-12)		Long-stolon sedge and manzanita increase, bitterbrush decreases.	Bitterbrush	Moderate to slow	Fair; intermediate wheat, orchard-grass, smooth brome	Moderate moderate moderate	Summer deer range
Ponderosa/sedge-fescue-peavine (CP-G2-12)		Pinegrass, sedge, peavine, squirreltail increase.	Idaho fescue long-stolon sedge	Rapid	Good; hard fescue, mountain brome, intermediate wheat	High low-none high	Summer deer range
Ponderosa/bitterbrush/squirreltail (rhylite) (CP-S2-18)		Current, goldenweed & squirreltail increase	Bitterbrush, squirreltail	Moderate	Poor; crested and intermediate wheatgrass	Low low low	Spring-fall deer range
Ponderosa/bitterbrush-sagebrush/squirreltail (rhylite) (CP-S1-12)		Sagebrush, rabbitbrush & squirreltail increase.	Bitterbrush, squirreltail	Slow except if sage absent	Fair; crested wheat, intermediate wheat	Low moderate low	Winter deer range. Diverse songbird habitat.

- (1) Rate of Range Trend: time necessary to double density of herbaceous vegetation without livestock use and severe soil disturbance as accompanies logging: slow = 10 years or more; moderate = 5-10 years; rapid = less than 5 years.
- (2) Revegetation: potential is the relative success that a site can be revegetated assuming an optimum technique is employed. Poor = maximum crown cover of seeded species doesn't exceed 30%. Fair = 30-60% crown cover potential. Good = greater than 60% crown cover. Most recommended species are given or reasons for poor performance.
- (3) Herbage Production: is 50% of the total, palatable forage produced under good range condition or managed timber crown cover conditions. Low = less than 50 lbs/acre. Moderate = 50-150 lbs/acre. High = 150-300 lbs/acre. Very high = greater than 300 lbs/acre.

FOREST TYPES
RANGE AND WILDLIFE SECTION
(Cont.)

Plant Community	Criteria	Native Understory Response to Timber Mgmt.	Decreasers; Key Plants	Rate of Range Trend	Revegetation Potential - Species	Herbage Production Native-Browse-Revegetation	Wildlife Consideration
Mixed conifer/snowbrush-manzanita (CW-S1-12)		Increase in manzanitas & snowbrush. Bitterbrush decreases.	Bitterbrush (transitory range)	Slow	Fair; orchardgrass, wt. brome, intermediate wheat	Low moderate moderate	Cover on deer summer range.
Mixed conifer/snowbrush-chinkapin (CW-H1-11)		Increase in manzanitas, snowbrush & chinkapin.	(Nonrange)	Slow	Poor; orchardgrass, intermediate wheat	Low low low	Cover on deer summer range.
Mixed conifer/snowbrush (CW-S1-14)		Increase in manzanitas & snowbrush.	(Nonrange)	Slow	Poor; orchardgrass, timothy, hard fescue	Low low low	Cover for deer on summer range.
Mixed conifer/snowbrush/sedge (CW-S1-15)		Long-stolon sedge, manzanita & snowbrush increases. Canopy closure affects snowbrush.	Bitterbrush long-stolon sedge (transitory range)	Slow	Fair; orchardgrass, smooth brome	Moderate low high	Cover & forage for deer summer range.
Mixed conifer/snowbrush/sedge-brackenfern (CW-C2-13)		Increase in manzanita, snowbrush, sedge, brackenfern.	Sedge, fescue pinegrass (transitory range)	Moderate	Good; wt. brome, orchardgrass, hard fescue	Moderate low high	Summer range for deer.
Mixed conifer/manzanita/snowbrush/sedge-penstemon (CW-S1-13)		Long-stolon sedge, snowbrush and manzanita increase.	(Nonrange)	Moderate	Good; wt. brome, orchardgrass, hard fescue	Low low high	Summer mule deer range.
Mixed conifer/manzanita (CW-S1-11)		Pinemat & greenleaf manzanita increase.	(Nonrange)	Slow	Poor; alpine timothy, hard fescue	Low low low	Summer deer range, marten.
Mixed conifer/snowbrush-chinkapin/pinegrass (CW-C2-12)		Manzanita, snowbrush, chinkapin increase.	No decrease; pinegrass (transitory range)	Moderate	Good; orchardgrass, hard fescue, smooth brome	Moderate moderate high	Summer deer range, grouse occasional.
Mixed conifer/snowbrush-chinkapin/brackenfern (CW-C2-11)		Manzanita, snowbrush, chinkapin & brackenfern increase.	(Nonrange)	Slow	Good; orchardgrass, hard fescue, smooth brome	Moderate low high	Summer deer range, grouse occasional.
Mixed conifer/snowberry/pinegrass (CD-S6-14)		Manzanita, squawcarpet, princepspine, peavine increase. Canopy closure affects pinegrass.	Pinegrass (transitory range)	Moderate	Good; orchardgrass, hard fescue, intermediate wheat	Moderate moderate high	Summer deer range; grouse occasional.
Mixed conifer/snowberry forb (CD-S6-13)		Increase in chinkapin, snowbrush, blackberry, manzanita & twinflower.	(Nonrange)	Slow	Good; orchardgrass, hard fescue, brome	Moderate moderate high	Summer deer range.
Mixed conifer/snowberry/twinflower flatlands (CD-S6-12)		Increase in trailing blackberry, twinflower, peavine, brome, princepspine.	Blue wildrye pinegrass (transitory range)	Rapid	Excellent; orchardgrass, hard fescue, smooth brome	Moderate moderate high	Spring-fall-summer deer range; some raptorial species. Grouse.
Engelmann spruce bottomlands (CW-C9-11)		Increase in trailing blackberry & twinflower.	Unknown	Unknown	Excellent; orchardgrass, tall fescue, smooth brome	Moderate low high	Summer-fall range for deer & elk; raptorial birds. Grouse.
Mountain hemlock/grouse huckleberry (CH-S1-11)		Increase in sedge and smooth woodrush.	(Nonrange)	Slow	Poor; alpine timothy	Low low low	Summer range for deer and elk.

(1) Rate of Range Trend: time necessary to double density of herbaceous vegetation without livestock use and severe soil disturbance as accompanies logging: slow = 10 years or more; moderate = 5-10 years; rapid = less than 5 years.

(2) Revegetation: potential is the relative success that a site can be revegetated assuming an optimum technique is employed. Poor = maximum crown cover if seeded species doesn't exceed 30%. Fair = 30-60% crown cover potential. Good = greater than 60% crown cover. Most recommended species are given or reasons for poor performance.

(3) Herbage Production: is 50% of the total, palatable forage under good range condition or managed timber crown cover conditions. Low = less than 50 lbs/acre. Moderate = 50-150 lbs/acre. High = 150-300 lbs/acre. Very high = greater than 300 lbs/acre.

FOREST TYPES
TIMBER MANAGEMENT SECTION I

Criteria	(1) Tree Productivity (ft ³ /A/yr-SPP)	(2) Natural Regeneration Chance within 5 yr.	(3) Artificial Regeneration Species - Treatment	(4) Precommercial Thinning Stocking in TPA by ave. DBH
Lodgepole/sedge-grass wetland (CL-M1-11)	High (48-115 LP)	Excellent; Overstory release	Excellent: LP Scarify herbaceous layer	Desirable. 6" = 360 TPA 8" = 215 10" = 130
Lodgepole/blueberry/ forb wetland (CL-M3-11)	Moderately high (30-91 LP)	Excellent; Overstory release	Excellent: LP Scarify herbaceous layer	Desirable. 6" = 320 TPA 8" = 175 10" = 120
Lodgepole/bearberry (CL-M2-11)	Moderate (12-56 LP)	Excellent; Overstory release	Excellent: LP Scarify grasses if wait 3 yrs. post harvest	Needed. 6" = 240 TPA 8" = 135 10" = 87
Lodgepole/bitterbrush/ forb (CL-S2-13)	Moderate (19-44 LP)	Excellent; Overstory release	Excellent: LP Scarify grasses if wait 2-3 yrs. post harvest	Needed. 6" = 220 TPA 8" = 120 10" = 80
Lodgepole/sagebrush/ fescue (CL-S1-11)	(Not available)	Fair to poor	Fair: LP Scarify for sagebrush & fescue competition	(Not available)
Lodgepole/bitterbrush/ fescue (CL-S2-14)	Moderate (27-66 LP)	Fair to poor due to fescue	Good: LP Scarify fescue com- petition	Needed. 6" = 280 TPA 8" = 160 10" = 100
Lodgepole/bitterbrush/ needlegrass (CL-S2-11)	Moderate (17-59 LP)	Fair to poor below 5000'. Good above shelterwood	Good: LP Provide overhead pro- tection	Needed. 6" = 210 TPA 8" = 118 10" = 75
Lodgepole/currant- bitterbrush/needle- grass (CL-S2-15)	Moderate (22-52 LP)	Fair; clearcuts or shelterwood	Good: LP Localized scarification for goldenweed	Needed. 6" = 190 TPA 8" = 110 10" = 70
Lodgepole/needlegrass basins (CL-G3-11)	Low (6-37 LP)	Very poor due to frost & desiccation	Fair: LP Maintain overstory pro- tection; never production tested	Needed. 6" = 145 TPA 8" = 85 10" = 50
Lodgepole/sedge-needle- grass basins (CL-G4-13)	Very low (13 LP)	Very poor	Fair: LP Maintain overstory pro- tection; never production tested	Needed. 6" = 100 TPA 8" = 55 10" = 34
Lodgepole/bitterbrush/ sedge (CL-S2-12)	Moderately high (28-79 LP)	Good; shelterwoods	Good: LP Scarify for sedge com- petition	Needed. 6" = 350 TPA 8" = 200 10" = 130

- (1) Tree Productivity: volume production given as five qualitative classes depending upon variation of mean cu. ft./A/yr across all communities: Low = 14-22 cu. ft./A/yr; moderately low = 23-30; moderate = 31-40; moderately high = 41-60; high = greater than 60. Range of productivity is given for the primary species in cu. ft./A/yr. Species are PP = ponderosa pine, LP = lodgepole pine, DF = Douglas-fir, WP = white fir, MH = mountain hemlock, SRF = Shasta red fir-noble fir.
- (2) Natural Regeneration: the probability of successful seeding establishment within 5 years after harvest and slash disposal is given as qualitative classes: excellent = satisfactory stocking at time of harvest; good = at least 80% chance of establishment; fair = 34 to 80% chance; poor = 5-33% chance; very poor = practically no chance due to combination of seed years, microclimate & predation. Suggested silvicultural system to achieve regeneration goal is mentioned.
- (3) Artificial Regeneration: relative success for establishing and growing the most adaptable species to the community. Species not listed are less adaptable and less successful if introduced as planting stock.
- (4) Precommercial Thinning: necessity to precommercial thin due to stagnation potential of the site. Desirable = thinning will improve growth but risk of stagnation is not serious. Needed = thinning improves growth since stagnation risk is high without the treatment. Stocking is given as trees/acre by average dbh at entry. Stocking rates are based upon the mean GBAL5 value for each community and necessary trees/acre to grow 10 rpi diameter increment. The variability in these stocking rates is determined by confidence interval/mean. Use lower TPA stocking on poorer sites for each community.

FOREST TYPES

TIMBER MANAGEMENT SECTION 1 (Cont.)

Criteria	(1) Tree Productivity (ft. ³ /A/yr-SPP)	(2) Natural Regeneration Chance within 5 yr.	(3) Artificial Regeneration Species - Treatment	(4) Precommercial Thinning Stocking in TPA by ave. DBH
Plant Community				
Lodgepole/sedge-lupine (CL-G4-11)	High below 6000' (42-108 LP)	Good; overstory release or shelterwood	Good: LP Scarify for sedge com- petition	Desirable. 6" = 340 TPA 8" = 225 10" = 140
Lodgepole/sedge-lupine- penstemon (CL-G4-12)	High (70-96 LP)	Excellent to good; shelterwood	Good-excellent: LP Scarify sedge & pen- stemon	Needed. 6" = 440 TPA 8" = 250 10" = 160
Lodgepole/needlegrass-lupine (CL-G3-14)	Moderately low (17-46 LP)	Poor; leave heavy shelter- wood	Fair: LP Access limited by spring snowpack	Needed. 6" = 225 TPA 8" = 120 10" = 78
Lodgepole/needlegrass-lupine-linanthastrum (CL-G3-13)	Moderately high (25-61 LP)	Fair; shelterwood	Good-fair: LP Scarify sedge competition	Needed. 6" = 250 TPA 8" = 155 10" = 98
Lodgepole/sagebrush (Rhyolite) (CL-S1-12)	Moderately low (17-35 LP)	Poor; shelterwood nec- essary	Poor: LP Attempt planting under shelterwood	Needed. 6" = 170 TPA 8" = 98 10" = 57
Lodgepole/bitterbrush (Rhyolite) (CL-S2-16)	Moderately low (26-34 LP)	Fair to poor; shelterwood	Good: LP Poor: PP	Needed. 6" = 230 TPA 8" = 130 10" = 85
Lodgepole/beargrass (CL-M4-11)	High (71-88 LP)	Good; shelterwood for tolerant species	Good: LP Fair: tolerant species Scarify for sedge, beargrass	Needed. 6" = 430 TPA 8" = 230 10" = 155
Lodgepole/snowbrush- manzanita (CL-S9-11)	Moderate (14-79 LP)	Good: LP Fair: PP, WF Shelterwood for PP, WF	Good for all species. Brush control may be necessary	Needed. 6" = 230 TPA 8" = 130 10" = 85
Lodgepole/manzanita (CL-S3-11)	Low (7-26 LP)	Very poor: LP shelterwood necessary	Fair: LP Provide overhead pro- tection	Needed. 6" = 120 TPA 8" = 66 10" = 37
Lodgepole/grouse huckleberry (CL-S4-16)	Moderate (31-67 LP)	Fair: LP Poor: MH shelterwood	Fair: LP Poor: MH Provide overhead protec- tion.	Needed. 6" = 275 TPA 8" = 155 10" = 100

- (1) Tree Productivity: volume production given as five qualitative classes depending upon variation of mean cu. ft./A/yr across all communities: Low = 14-22 cu. ft./A/yr; moderately low = 23-30; moderate = 31-40; moderately high = 41-60; high = greater than 60. Range of productivity is given for the primary species in cu. ft./A/yr. Species are PP = ponderosa pine, LP = lodgepole pine, DF = Douglas-fir, WF = white fir, MH = mountain hemlock, SRF = Shasta red fir-noble fir.
- (2) Natural Regeneration: the probability of successful seedling establishment within 5 years after harvest and slash disposal is given as qualitative classes: excellent = satisfactory stocking at time of harvest; good = at least 80% chance of establishment; fair = 34 to 80% chance; poor = 5-33% chance; very poor = practically no chance due to combination of seed years, microclimate & predation. Suggested silvicultural system to achieve regeneration goal is mentioned.
- (3) Artificial Regeneration: relative success for establishing and growing the most adaptable species to the community. Species not listed are less adaptable and less successful if introduced as planting stock.
- (4) Precommercial Thinning: necessity to precommercial thin due to stagnation potential of the site. Desirable = thinning will improve growth but risk of stagnation is not serious. Needed = thinning improves growth since stagnation risk is high without the treatment. Stocking is given as trees/acre by average dbh at entry. Stocking rates are based upon the mean CBA15 value for each community and necessary trees/acre to grow 10 rpi diameter increment. The variability in these stocking rates is determined by confidence interval/mean. Use lower TPA stocking on poorer sites for each community.

FOREST TYPES

TIMBER MANAGEMENT SECTION I (Cont.)

Criteria	(1) Tree Productivity (ft ³ /A/yr-SPP)	(2) Natural Regeneration Chance within 5 yr.	(3) Artificial Regeneration Species - Treatment	(4) Precommercial Thinning Stocking in TPA by ave. DBH
Ponderosa/bitterbrush-sagebrush/fescue (CP-S1-11)	Low-moderately low (17-37 PP)	Very poor	Poor: PP Scarify sagebrush, wheatgrass and fescue	Needed. 6" = 190 TPA 8" = 105 10" = 68
Ponderosa/bitterbrush-bunchgrass (CP-S2-16)	Moderately low (13-49 PP)	Very poor	Poor-fair: PP Scarify wheatgrass & fescue	Needed. 6" = 165 TPA 8" = 100 10" = 65
Ponderosa/bitterbrush-fescue (CP-S2-11)	Moderate-mod. high (15-89 PP)	Poor on Ft. Rock RD Fair-good elsewhere Shelterwood	Fair-good: PP Scarify fescue	Needed. 6" = 270 TPA 8" = 150 10" = 97
Ponderosa/bitterbrush-manzanita/fescue (CP-S2-17)	Moderate (25-63 PP)	Poor, due to fescue competition	Fair: PP Scarify fescue	Needed. 6" = 270 TPA 8" = 150 10" = 95
Ponderosa/bitterbrush-snowbrush/fescue (CP-S3-14)	Moderately high (49-63 PP)	Fair, clear-cut or shelterwood	Fair: PP Scarify for sedge & fescue	Needed. 6" = 310 TPA 8" = 170 10" = 110
Ponderosa/bitterbrush-needlegrass (CP-S2-12)	Moderate (20-105 PP)	Poor-good depending upon latitude	Good: PP	Needed. 6" = 230 TPA 8" = 130 10" = 85
Ponderosa/bitterbrush-manzanita/needlegrass (CP-S2-13)	Moderate to low (17-52 PP)	Poor; shelterwood or patch clear-cut as snag patches	Fair-good: PP depending on latitude. Scarify for manzanita	Needed. 6" = 210 TPA 8" = 115 10" = 75
Ponderosa/bitterbrush-snowbrush/needlegrass (CP-S3-11)	Moderately high (33-83 PP)	Fair-good; shelterwood or patch clear-cut	Fair-good: PP Scarify for shrub competition	Needed. 6" = 300 TPA 8" = 170 10" = 110
Ponderosa/bitterbrush-sedge (CP-S2-15)	Moderate (19-54 PP)	Fair-poor; Shelterwood	Fair: PP Scarify for sedge	Needed. 6" = 200 TPA 8" = 110 10" = 75
Ponderosa/bitterbrush-manzanita/sedge (CP-S2-14)	Moderately low (10-38 PP)	Poor; Shelterwood	Fair: PP Scarify for sedge	Needed. 6" = 130 TPA 8" = 75 10" = 40
Ponderosa/bitterbrush-snowbrush/sedge (CP-S3-12)	Moderate (31-42 PP)	Poor; Shelterwood or clear-cut	Good-fair: PP Scarify for sedge	Needed. 6" = 200 TPA 8" = 110 10" = 73
Ponderosa/sedge-fescue-peavine (CP-G2-12)	High (60-132 PP)	Excellent; Heavy shelterwood	Good: PP Scarify for sedge, peavine, pinegrass	Desired. 6" = 460 TPA 8" = 260 10" = 160
Ponderosa/bitterbrush-squirreltail (rhyolite) (CP-S2-18)	Moderately low (15-57 PP)	Poor; Shelterwood	Fair-poor: PP Good: LP Light scarification	Needed. 6" = 105 TPA 8" = 65 10" = 40
Ponderosa/bitterbrush-sagebrush/squirreltail (rhyolite) (CP-S1-12)	Low (17 PP)	Poor; Shelterwood necessary	Fair-poor: PP Scarify browse competition	Needed. 6" = 105 TPA 8" = 65 10" = 40

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- (2) Natural Regeneration: the probability of successful seedling establishment within 5 years after harvest and slash disposal is given as qualitative classes: excellent = satisfactory stocking at time of harvest; good = at least 50% chance of establishment; fair = 34 to 80% chance; poor = 5-33% chance; very poor = practically no chance due to combination of seed years, microclimate & predation. Suggested silvicultural system to achieve regeneration goal is mentioned.
- (3) Artificial Regeneration: relative success for establishing and growing the most adaptable species to the community. Species not listed are less adaptable and less successful if introduced as planting stock.
- (4) Precommercial Thinning: necessity to precommercial thin due to stagnation potential of the site. Desirable = thinning will improve growth but risk of stagnation is not serious. Needed = thinning improves growth since stagnation risk is high without the treatment. Stocking is given as trees/acre by average dbh at entry. Stocking rates are based upon the mean GBA15 value for each community and necessary trees/acre to grow 10 tpi diameter increment. The variability in these stocking rates is determined by confidence interval/mean. Use lower TPA stocking on poorer sites for each community.

FOREST TYPES

TIMBER MANAGEMENT SECTION I (Cont.)

Criteria	(1) Tree Productivity (ft. ³ /A/yr.)	(2) Natural Regeneration (Chance within 5 yr.)	(3) Artificial Regeneration Species - Treatment	(4) Precommercial Thinning Stocking in TPA by ave. DBH
Plant Community				
Mixed conifer/snowbrush- manzanita (CW-S1-12)	Moderate to mod. high (18-94 PP)	Good in north, poor in south; shelterwood	Good: PP Scarify for shrubs	Needed. 6" = 300 TPA 8" = 170, 10" = 107
Mixed conifer/snowbrush- chinkapin (CW-M1-11)	Moderately high (22-74 PP)	Good: DF, WF shelterwood or small clear-cuts	Good: PP Scarify for shrubs	Needed. 6" = 300 TPA 8" = 170 10" = 107
Mixed conifer/snowbrush (CW-S1-14)	Moderately high (29-51 PP)	Fair to good: PP clear-cut, shelterwood	Good: PP Scarify for shrubs	Needed. 6" = 250 TPA 8" = 140 10" = 90
Mixed conifer/snowbrush/ sedge (CW-S1-15)	Moderately high (31-84 PP)	Fair: PP small clear-cut or shelterwood	Good: PP Must scarify for long- stolon sedge	Needed. 6" = 320 TPA 8" = 180 10" = 115
Mixed conifer/snowbrush/ sedge-brackenfern (CW-C2-13)	Moderately high (44-65 PP)	Good: PP, DF, WF clear-cut or shelterwood	Good: PP Fair: DF, WF Control sedge & bracken	Needed all species. 6" = 310 TPA 8" = 170 10" = 110
Mixed conifer/manzanita- snowbrush/sedge- penstemon (CW-S1-13)	Moderately high to high (76-123 PP)	Good: WF, DF, PP clear-cut or shelterwood	Good: PP Scarify sedge cover	Needed. 6" = 560 TPA 8" = 310 10" = 200
Mixed conifer/manzanita (CW-S1-11)	Moderate to low	Poor: WF, SRF, MH light shelterwoods	Poor: DF, WF, SRF Fair to good: LP Brush control necessary	Recommended for fire or pine. 6" = 305 TPA 8" = 175 10" = 110
Mixed conifer/snowbrush- chinkapin/pinegrass (CW-C2-12)	High (41-127 PP) (106-130 DF)	Good: PP, WF, DF shelterwood for fire	Good: PP, DF Scarify for pinegrass & shrub	Needed for pine. 6" = 380 TPA 8" = 220 10" = 140
Mixed conifer/snowbrush- chinkapin/brackenfern (CW-C2-11)	Moderately high to high (40-102 PP)	Good for all species, shelter- wood for fire	Good: PP, DF Scarify for bracken & sedge	Needed on pine. 6" = 340 TPA 8" = 190 10" = 120
Mixed conifer/snowberry/ pinegrass (CD-S6-14)	High (61-117 PP) (95-129 DF)	Good for all species, shelter- wood for fire	Good: PP, DF Scarify for pinegrass	Needed on PP, DF. 6" = 420 TPA 8" = 240 10" = 160
Mixed conifer/snowberry/ forb (CD-S6-13)	High (136-170 PP) (130-210 DF)	Good for DF, WF clear-cuts for pine shelterwood for fire	Good except in deeper volcanic sands. Scar- ify for shrubs	Desirable for pine. 8" = 400 TPA 10" = 250
Mixed conifer/snowberry/ twinflower flatlands (CD-S6-12)	High (66-147 PP) (109-162 DF)	Excellent; shelter- wood or small patch cuts	Excellent: all species Scarify blackberry & twinflower	Needed for pines, not fire. 6" = 480 TPA 8" = 270 10" = 170
Engelmann spruce bottomlands (CW-C9-11)	High	Excellent; light shelterwood	Excellent: PP, LP, DF Scarify shrubs & forbs	Needed for pines, not WF, ES. 6" = 600 TPA 8" = 350 10" = 220
Mountain hemlock/grouse huckleberry (CM-S1-11)	Low to moderate	Fair; moderate shelterwood	Good: LP Poor: MH Scarify sedge	Needed for pines & hemlock 6" = 470 8" = 260 10" = 170

- (1) Tree Productivity: volume production given as five qualitative classes depending upon variation of mean cu. ft./A/yr across all communities: Low = 14-22 cu.ft./A/yr; moderately low = 23-30; moderate = 31-40; moderately high = 41-60; high = greater than 60. Range of productivity is given for the primary species in cu. ft./A/yr. Species are PP = ponderosa pine, LP = lodgepole pine, DF = Douglas-fir, WF = white fir, MH = mountain hemlock, SRF = Shasta red fir-noble fir.
- (2) Natural Regeneration: the probability of successful seedling establishment within 5 years after harvest and slash disposal is given as qualitative classes: excellent = satisfactory stocking at time of harvest; good = at least 50% chance of establishment; fair = 34-80% chance; poor = 5-33% chance; very poor = practically no chance due to combination of seed years, microclimate & predation. Suggested silvicultural system to achieve regeneration goal is mentioned.
- (3) Artificial Regeneration: relative success for establishing and growing the most adaptable species to the community. Species not listed are less adaptable and less successful if introduced as planting stock.
- (4) Precommercial thinning: necessity to precommercial thin due to stagnation potential of the site. Desirable = thinning will improve growth but risk of stagnation is not serious. Needed = thinning improves growth since stagnation risk is high without the treatment. Stocking is given as trees/acre by average dbh at entr. Stocking rates are based upon the mean CBA15 value for each community and necessary trees/acre to grow 10 rpl diameter increment. The variability in these stocking rates is determined by confidence interval/mean. Use lower TPA stocking on poorer sites for each community.

FOREST TYPES
TIMBER MANAGEMENT SECTION II

Criteria	Disease Potential	Bark Beetle Risk	Windthrow Risk	Pocket Gopher Potential	Operability Constraints	Special Problems
Plant Community Lodgepole/sedge-grass wetland (CL-M1-11)	Dwarf mistletoe & gall rust common on lodgepole	Moderate to high	Moderate to high	Low to locally moderate	Seasonally high water table	Compaction & soil displacement with equipment on wet soils.
Lodgepole/blueberry/forb wetland (CL-M3-11)	Dwarf mistletoe & gall rust common on lodgepole	Moderate to high	Moderate to high	Low to locally moderate	Seasonally high water table	Compaction & soil displacement with equipment on wet soils.
Lodgepole/bearberry (CL-M2-11)	Dwarf mistletoe common on LP	Moderate	Low to moderate	Common	Compaction of moist soils in early summer	Presence of gophers near meadows. Preferred wildlife habitat.
Lodgepole/bitterbrush/forb (CL-S2-13)	Dwarf mistletoe & gall rust common	Moderate	Low to moderate	Locally common	Compaction of moist soils in early summer	Presence of gophers near meadows. Preferred wildlife habitat.
Lodgepole/sagebrush/fescue (CL-S1-11)	(Unknown)	Low	Low	Low	None	
Lodgepole/bitterbrush/fescue (CL-S2-14)	Dwarf mistletoe moderate on LP	Low to moderate	Low	Low to absent	Seasonally high water table	Fescue important competition to shrubs & planted trees.
Lodgepole/bitterbrush/needlegrass (CL-S2-11)	Dwarf mistletoe & gall rust variable	Locally common	Moderate	High near wet sites	None	Large variation in success of natural regeneration w/elevation.
Lodgepole/currant-bitterbrush/needlegrass (CL-S2-15)	Dwarf mistletoe & gall rust common on LP	Locally common	Low to moderate	Low	None	
Lodgepole/needlegrass basins (CL-G3-11)	Dwarf mistletoe locally common on LP	Low	Moderate	Moderate near wet sites	Localized high water table during spring	Severe frost heaving in spring & autumn months.
Lodgepole/sedge-needlegrass basins (CL-G4-13)	Dwarf mistletoe common	Moderately low	Moderate	Moderate	Short operating season due to snowpack	Frost damage of planted stock probable.
Lodgepole/bitterbrush/sedge (CL-S2-12)	Dwarf mistletoe light	Low	Low	Low	None	Basic scoria flow soils are very cobbly
Lodgepole/sedge-lupine (CL-G4-11)	Dwarf mistletoe & gall rust locally common on LP	High, locally common	Low	High	Late snowpacks at higher elevations	Expect major buildup in pocket gophers after logging.
Lodgepole/sedge-lupine-penstemon (CL-G4-12)	Dwarf mistletoe moderate on lodgepole	Low	Low	Light to moderate	Short operating season due to snowpack	Can expect increase in gophers after logging.
Lodgepole/needlegrass-lupine (CL-G3-14)	Dwarf mistletoe & gall rust locally severe on LP	Locally common	Low	Moderate to high	Short operating season, high elevation, non commercial	Poorly developed soils and frost heaving hamper regeneration.
Lodgepole/needlegrass-lupine-linanthastrum (CL-G3-13)	Dwarf mistletoe & western gall rust common	Moderate to high	Low	Very high	Soils easily displaced by equipment	Preferred habitat of pocket gophers. Beetles are active.
Lodgepole/sagebrush (rhyolite) (CL-S1-12)	Dwarf mistletoe very occasional	Low	Moderate to low	Low		Newberry rhyolite difficult medium for planting trees.
Lodgepole/bitterbrush (rhyolite) (CL-S2-16)	Dwarf mistletoe occasional over type	Low	Moderate	Very low	Local basalt flow outcrops & thin soils	
Lodgepole/beargrass (CL-M4-11)	Western gall rust on lodgepole	Locally high	Low	Very high	Short operating season due to snowpack	Expect increase in gophers after logging.
Lodgepole/snowbrush-manzanita (CL-S9-11)	Dwarf mistletoe & western gall light on LP	Low	Low	Low		Lodgepole very aggressive after logging.
Lodgepole/manzanita (CL-S3-11)	Dwarf mistletoe common on LP	Low	Windthrow & stem breakage common	Low	Short operating season due to snowpack	Soils resist wetting, characteristic accentuated by slash burning.
Lodgepole/grouse huckleberry (CL-S4-16)	Dwarf mistletoe occasional on LP. Gall rust common.	Low	Snow breakage common	Low	Short operating season due to snowpack	Soils resist wetting, frost heaving & short growing season.

FOREST TYPES

TIMBER MANAGEMENT SECTION II (Cont.)

Criteria		(1) Insect Risk	Windthrow Risk	Pocket Gopher Potential	Operability Constraints	Special Problems
Plant Community	Disease Potential					
Ponderosa/bitterbrush-sagebrush/fescue (CP-S1-11)	Dwarf mistletoe absent	Low	Low	Low	Steep slopes limit equip. on some sites.	Avoid winter-time harvest--schedule around wildlife needs.
Ponderosa/bitterbrush-bunchgrass (CP-S2-16)	Dwarf mistletoe common on ponderosa.	Low	Low	Low	Steep, stoney soil limit revegetation	Invasion of juniper with fire control.
Ponderosa/bitterbrush-fescue (CP-S2-11)	Common mistletoe Comandra or Elytroderma	Moderate to high	Low	Low	Moist to wet soils in spring	Revegetation not recommended on outwash soils.
Ponderosa/bitterbrush-manzanita/fescue (CP-S2-17)	Dwarf mistletoe locally severe	Moderate to high	Low	Low	None	Idaho fescue dominance slows bitterbrush establishment.
Ponderosa/bitterbrush-snowbrush/fescue (CP-S3-14)	Dwarf mistletoe not apparent	Low	Low	Locally moderate	None	Expect increase in long-stolon sedge, a rhizomatous competitor.
Ponderosa/bitterbrush-needlegrass (CP-S2-12)	Dwarf mistletoe & Comandra rust occasional.	Pine shoot borer common	Moderate in south	Low	None	One of most xeric ponderosa communities.
Ponderosa/bitterbrush-manzanita/needlegrass (CP-S2-13)	Dwarf mistletoe common on ponderosa.	Low	Low	Low	None	Planting may be hindered by brush stands.
Ponderosa/bitterbrush-snowbrush/needlegrass (CP-S3-11)	Dwarf mistletoe locally severe	Pine shoot borer common	Low	Low	None	Planting may be hindered by brush stands.
Ponderosa/bitterbrush-sedge (CP-S2-15)	Moderate mistletoe light Elytroderma on ponderosa	Moderate to low	Low	Low	None	Site occupancy by understory within 3 yrs after scarify.
Ponderosa/bitterbrush-manzanita/sedge (CP-S2-14)	Moderate dwarf mistletoe on ponderosa	Moderate to high	Low	Locally moderate	None	Stands on dacite pumice flow are very cobbly.
Ponderosa/bitterbrush-snowbrush/sedge (CP-S3-12)	Dwarf mistletoe locally heavy.	Low	Low	Locally moderate	None	
Ponderosa/sedge-fescue-peavine (CP-C2-12)	Dwarf mistletoe very occasional	Low	Low	Very high	None	Preferred pocket gopher habitat.
Ponderosa/bitterbrush-squirreltail (rhyolite) (CP-S2-18)	Dwarf mistletoe on lodgepole	Low	Low	Low	None	Lodgepole aggressive after scarify soil.
Ponderosa/bitterbrush-sagebrush/squirreltail (rhyolite) (CP-S1-12)	Very low	Low	Low	Low	None	Control of sagebrush may increase rabbitbrush.

(1) Bark beetle risk unless otherwise stated.

FOREST TYPES
TIMBER MANAGEMENT SECTION II (Cont.)

Criteria		(1) Insect Risk	Windthrow Risk	Pocket Gopher Potential	Operability Constraints	Special Problems
Plant Community	Disease Potential					
Mixed conifer/snowbrush- manzanita (CW-S1-12)	Dwarfmistletoe moderate on pine	Moderate	Low	Low	None	
Mixed conifer/snowbrush- chinkapin (CW-H1-11)	Dwarfmistletoe common on pine & Douglas-fir	Moderate	Low	Low	None	
Mixed conifer/snowbrush (CW-S1-14)	Dwarfmistletoe locally common on pine	Pine shoot borer	Low	Low	Shorter season due to snowpack	
Mixed conifer/snowbrush/ sedge (CW-S1-15)	Light dwarfmis- tletoe on pine	Low	Low	Low	None	Expect increase in sedge with logging disturb- ance.
Mixed conifer/snowbrush/ sedge-brackenfern (CW-C2-13)	Commandra rust on pine occasional	Moderate to low	Low	Moderate to low	None	Excessive increase in brackenfern when scar- ify soil.
Mixed conifer/manzanita- snowbrush/sedge- penstemon (CW-S1-13)	Commandra rust & dwarfmistletoe occasional	Low	Low	Moderate	Short operating season	Expect some increase in gophers with logging.
Mixed conifer/manzanita (CW-S1-11)	Indian paint fungus on firs, hemlock. Mistletoe on lodgepole	Low	Moderate to high	Low	Limit scarifi- cation on poor- ly developed soils	Disturbed sites quickly occupied by manzanita and lodgepole pine.
Mixed conifer/snowbrush- chinkapin/pinegrass (CW-C2-12)	Dwarfmistletoe on pine and Douglas-fir	Low	Low	Low	None	Clear-cuts or heavy shelterwood necessary to maintain pine dominance.
Mixed conifer/snowbrush- chinkapin/brackenfern (CW-C2-11)	Dwarfmistletoe & commandra rust on pine	Low	Low	Low	None	
Mixed conifer/snowberry/ pinegrass (CD-S6-14)	Dwarfmistletoe on DF, WF. Com- mandra rust on PP	Low	Low	Moderate to low	None	
Mixed conifer/snowberry/ forb (CD-S6-13)	Dwarfmistletoe common on Douglas-fir	Moderate to low	Low	High after logging	None	
Mixed conifer/snowberry/ twinflower flatlands (CD-S6-12)	Dwarfmistletoe on pine, larch, Douglas-fir. Indian paint on WF	Moderate	Moderate to high	Moderate to high	Wet soils in early summer	Compaction of moist soils thru mid summer by equipment.
Engelmann spruce bottomlands (CW-C9-11)	Indian paint fungus on firs	Low	High	Moderate	Wet soils thru mid summer	
Mountain hemlock/grouse huckleberry (CW-S1-11)	Indian paint fungus on hemlock; gall rust & mistletoe on lodgepole	Moderate for pine	High	Moderate to high	Short season due to snowpack	Natural openings with lupine & sedge have gophers. Stem breakage, pistol butt common.

(1) Bark beetle risk unless otherwise stated.

REGENERATION OPPORTUNITIES FOR LODGEPOLE PINE COMMUNITIES
IN THE CENTRAL OREGON PUMICE ZONE ^{1/}

Plant Community

Lodgepole/sedge-grass wetland (CLM1-11 p. 32)
Lodgepole/blueberry/forb wetland (CLM3-11 p. 33)
Lodgepole invasion into meadow sites

General - These are moist to wet plant communities with a high water table between spring and mid-summer. A soil compaction hazard. Communities found on Deschutes, Winema and Fremont National Forests.

Natural Regeneration - Possible within 5 years provided sufficient seed source is left. Scarification beyond harvest and slash treatment will not be necessary. Leave slash for frost protection in drainage bottoms. Appropriate prescriptions are harvest clear-cut and harvest seed cut.

Artificial Regeneration of Previously Unentered Stands - Harvest and slash treatment will provide sufficient site preparation (scarification) if planting is to immediately follow these activities. If not, scarification prior to planting is required. Appropriate prescriptions are harvest clear-cut or partial cuts to meet other resource objectives.

Artificial Regeneration of Previously Entered Stands - Additional site preparation after harvest and slash treatment is required prior to planting. Harvest clear-cut is the appropriate prescription.

Opportunity for Species Conversion - None, lodgepole pine is climax and is preferred following treatment. Ponderosa pine and true firs will sustain frost injury.

Planting Prescription - Soil is normally of adequate depth and texture for planting with an auger during the spring. Perched water tables may limit planting efforts. Use of a planting machine is not recommended due to potential for soil compaction.

Plantation Management - Mistletoe is common and should be removed from within and along the edges of plantation within 10 years of planting. Pocket gophers will require control. Deer and livestock protection may be required until trees are 3 to 4 feet tall.

Plant Community

Lodgepole/bearberry (CLM2-11 p. 34)
Lodgepole/bitterbrush/forb (CLS2-13 p. 35)

General - These are moist plant communities with a perched high water table during spring and early summer. A soil compaction hazard exists which precludes use of machine planting. Communities occur on Deschutes, Winema and Fremont National Forests.

Natural Regeneration - Can be assumed within five years provided sufficient seed source is left and scarification is done immediately prior to seedfall. This means that harvest and slash treatment will provide sufficient scarification for natural regeneration if it occurs just prior to seed fall, otherwise additional scarification will be required. Slash for frost protection should be left in drainage bottoms whenever the clear-cut method of harvest is used. Appropriate prescriptions are harvest clear-cut and harvest seed cut.

Artificial Regeneration in Previously Unentered Stands - Harvest and slash treatment will provide sufficient site preparation (scarification) if planting is to immediately follow these activities. If not, scarification prior to planting is required. Appropriate prescriptions include harvest clear-cut or partial cuts to meet other resource objectives.

^{1/} Originally entitled Regeneration Opportunities for Lodgepole Pine Communities of the Deschutes National Forest by Mike Panelli dated March 1982. Subsequent to Mike's sudden death in August 1982 the original white paper has been slightly revised, and expanded for application to the entire pumice deposition zone as found on the Deschutes, Winema and Fremont National Forest.

Artificial Regeneration in Previously Entered Stands - Additional site preparation after harvest and slash treatment is required prior to planting. Harvest clear-cut is the appropriate prescription.

Opportunity for Species Conversion - None, lodgepole pine is climax and is preferred following harvest. Ponderosa pine and true firs will sustain frost injury.

Planting Prescription - Soil is normally of adequate depth and texture for planting. The auger planting method is recommended with work done in the spring.

Plantation Management - Mistletoe is common and should be removed from within or along plantation edges within 10 years of planting. Pocket gophers will require control particularly if cutting units are located along meadows. Deer and livestock protection for planted seedlings may be required until trees are 3 to 4 feet tall.

Plant Community

Lodgepole/sagebrush/fescue (CLS1-11 p. 37)

Lodgepole/bitterbrush/fescue (CLS2-14 p. 39)

General - Communities occur on Deschutes National Forest and northern end of Silver Lake Ranger District, Fremont National Forest.

Natural Regeneration - Natural regeneration is possible within 10 years in lodgepole/bitterbrush/fescue provided sufficient seed source is left and scarification is done immediately prior to seed fall. Do not depend upon natural regeneration in lodgepole/sagebrush/fescue.

Artificial Regeneration in Previously Unentered Stands - Scarification in addition to that which occurs during harvest and slash treatment is required prior to planting. Exceptions to this may occur in lodgepole/bitterbrush/fescue if planting can be timed to follow harvest and slash disposal. Harvest clearcut is the appropriate prescription.

Artificial Regeneration in Previously Entered Stands - Additional site preparation after harvest and slash treatment will be required prior to planting due to Idaho fescue competition. Harvest clearcut is the appropriate prescription.

Opportunity for Species Conversion - None, lodgepole pine is climax and is preferred following harvest. The guide indicates that lodgepole/bitterbrush/fescue may have ponderosa pine as the climax species with lodgepole pine as seral. This occurs at the ecotone between this community and ponderosa/bitterbrush/fescue. There is little opportunity for species conversion to ponderosa pine because this is usually a gradual ecotone and difficult to identify sites for conversion to ponderosa pine. Ponderosa pine usually sustains cold injury within the lodgepole pine communities.

Planting Prescription - Soil is normally of adequate depth and texture for planting. Machine or auger planting during the spring is recommended. Seek to mix shallow 6 inch surface on Newberry rhyolite pumice with Mazama pumice which lies below.

Plantation Management - Remove Mistletoe where present in or adjacent to plantations within 10 years of planting. Pocket gophers are not anticipated to be a problem on fescue dominated sites. Deer and livestock protection of planted seedlings may be required until trees are 3 to 4 feet tall.

Plant Community

Lodgepole/bitterbrush/sedge (CLS2-12 p. 44)

General - Community restricted to immediate east slope of Cascades on Deschutes and Winema National Forest. Goldenweed and long-stolon sedge are increasers in this plant community. It is important to plant immediately following disturbance to prevent loss of site preparation.

Natural Regeneration - Possible within 5 years provided sufficient seed source is left and scarification is done immediately prior to seed fall. Harvest and slash treatment should provide sufficient scarification if it meets the timing constraint, otherwise additional scarification will be required. Scarification in this case must be sufficient to expose rhizomes of the long-stolon sedge. Naturals may be frost heaved on lower slope positions. Appropriate prescriptions are harvest clear-cut and harvest seed cut.

Artificial Regeneration in Previously Unentered Stands - Harvest and slash treatment will provide sufficient site preparation (scarification) if planting is to immediately follow these activities. If not, scarification (sufficient to expose rhizomes of long stolon sedge) prior to planting is required. Harvest clear-cut is the appropriate prescription.

Artificial Regeneration in Previously Entered Stands - Scarification, in addition to harvest and slash treatment, sufficient to expose rhizomes of long-stolon sedge is required prior to planting. Harvest clear-cut is the appropriate prescription.

Opportunity for Species Conversion - None, unless ponderosa pine or true fir is already established on upper elevations. Regeneration harvest prescriptions create the seral situation into which lodgepole should be planted.

Planting Prescription - Soil is normally of adequate depth and texture for planting. Machine or auger planting during the spring is recommended.

Plantation Management - Deer and livestock protection for planted seedlings may be required until trees are 3 to 4 feet tall.

Plant Community

Lodgepole/bitterbrush/needlegrass (CLS2-11 p. 40)

Lodgepole/currant-bitterbrush/needlegrass (CLS2-15 p. 41)

General - Communities occur on Descutes, Winema and Fremont National Forests. Although there is an opportunity to introduce ponderosa pine, efforts should be limited to the situations as described. Most of the acres should be regenerated to lodgepole.

Natural Regeneration - Possible above lower 1/3 slope positions within 10 years provided sufficient seed source is left and scarification is done immediately prior to seedfall. Lower 1/3 slope positions require extra effort due to frost heave of natural regeneration. Slash may provide sufficient protection, especially below 5000 feet elevation. The appropriate prescription is harvest shelterwood leaving 30-40 square feet of basal area per acre.

Artificial Regeneration in Previously Unentered Stands - Harvest and slash treatment will provide sufficient site preparation (scarification) if planting is to immediately follow these activities. If not, scarification prior to planting is required. Harvest clear-cut is the appropriate prescription.

Artificial Regeneration in Previously Entered Stands - Additional site preparation after harvest and slash treatment is required prior to planting. Harvest clear-cut is the appropriate prescription.

Opportunity for Species Conversion - Ponderosa pine can be introduced on favorable sites (convex, mid to upper third slope positions with south, southwest, and southeast exposures) within these communities. Planting ponderosa pine will extend the species downslope from the ponderosa/bitterbrush/needlegrass. Lodgepole pine should be planted in lower third and bottom slope positions.

Planting Prescription - Soil depth is variable for planting. Coarse C horizon material (popcorn) may lie near the surface; auger planting is recommended in this case. Where there is sufficient depth of A and AC material, either machine or auger planting will work. Depth of A and AC material should be determined on a unit by unit basis. Trees should be planted during the spring.

Plantation Management - Mistletoe is common and should be removed from within and along the edges of plantations within 10 years of planting. Pocket gophers will require control, especially near meadows and bearberry communities.

Plant Community

Lodgepole/needlegrass basins (CLG3-11 p. 42)

Lodgepole/sedge-needlegrass basins (CLG4-13 p. 43)

General - Communities common in elevated basins and flats of Deschutes, Winema and Fremont National Forests. These are cold, low productivity communities and should be considered low priority for any cultural activity.

Natural Regeneration - Natural regeneration is unreliable due to cold air drainage and radiation frost. Successful establishment will require more than 10 years.

Artificial Regeneration in Previously Unentered Stands - Scarification in addition to harvest and slash treatment is required. Harvest clear-cut or shelterwood are the appropriate prescription. Frost will be a damaging agent to tree seedlings. Slow seedling growth can be expected.

Artificial Regeneration in Previously Entered Stands - Same as above.

Opportunity for Species Conversion - None, lodgepole is climax and is preferred following harvest. Ponderosa pine will sustain cold injury.

Planting Prescription - Soil depth is variable for planting. Depth to coarse C horizon material should be determined for each and within each unit. Auger planting should occur in the spring. Seedling lots should be sorted so the tallest is planted in the lower third and bottom slope positions.

Plantation Management - Mistletoe is common and should be removed from within and along the edges of plantations within 10 years of planting. Pocket gophers are usually prevalent and will require control.

Plant Community

Lodgepole/needlegrass-lupine (CLG3-14 p. 48)

General - Community restricted to higher peaks of Winema and Fremont National Forests. This is a low productivity community with fragile soils. It should be a low priority for treatment.

Natural Regeneration - Regeneration is unreliable due to cold, xeric sites at high elevations.

Artificial Regeneration of Previously Unentered Stands - Harvest and slash treatment will provide sufficient site preparation (scarification) if planting is to immediately follow these activities. If not, scarification prior to planting is required. Harvest shelterwood is the appropriate prescription.

Artificial Regeneration of Previously Entered Stands - Additional site preparation after harvest and slash treatment is required prior to planting. Appropriate prescription is harvest shelterwood.

Opportunity for Species Conversion - None, lodgepole pine is climax and is preferred. Community occurs above elevational limit of ponderosa pine and true firs.

Planting Prescription - Soil depth is variable for planting. Buried horizons can be cobbly. Depth of pumice material may be shallow and should be determined for each and within each unit. Auger planting should occur in the spring.

Plantation Management - Mistletoe usually occasional and should be removed from within and along the edges of plantations within 10 years of planting. Frost protection may require use of rigid vexar for seedlings planted on exposed slopes. Deer protection of planted seedlings may be required until trees are 3 to 4 feet tall.

Plant Community

Lodgepole/sedge-lupine-penstemon (CLG4-12 p. 47)

Lodgepole/sedge-lupine (CLG4-11 p. 46)

Lodgepole/needlegrass-lupine-linanthastrum (CLG3-13 p. 49)

General - Communities located on immediate east slope of Cascades of Deschutes and Winema National Forests and Paulina Peak area. Clearcutting, burning, and other disturbance favor long-stolon sedge, goldenweed, and pocket gophers.

Natural Regeneration - Possible within 5 years provided sufficient seed source is left and scarification is done immediately prior to seed fall. Harvest and slash treatment should provide sufficient scarification if it meets the timing constraint. Otherwise, additional scarification will be required. Scarification in this case must be sufficient to expose rhizomes of long-stolon sedge. Appropriate prescriptions are harvest seed tree and harvest shelterwood.

Artificial Regeneration of Previously Unentered Stands - Scarification in addition to harvest and slash treatment is required in order to control expansion of long-stolon sedge. Harvest clear-cut is the appropriate prescription.

Artificial Regeneration of Previously Entered Stands - Same as above.

Opportunity for Species Conversion - None, regenerate to lodgepole pine. Natural seeding of ponderosa pine, Shasta red fir, or white fir may occur gradually under a lodgepole pine canopy.

Planting Prescription - Soil is normally of adequate depth and texture for planting with a machine or auger during the spring.

Plantation Management - Mistletoe is common and should be removed from within and along the edges of plantations within 10 years of planting. Pocket gophers will require control. Deer and livestock protection may be required until trees are 3 to 4 feet tall.

Plant Community

Lodgepole/bitterbrush (rhyolite) (CLS2-16 p. 38)

General - Community is restricted to Ft. Rock Ranger District, Deschutes National Forest. Surface rhyolite pumice depth is a limiting factor. This community has low productivity and is low priority for regeneration.

Natural Regeneration - Regeneration is unreliable due to xeric and insulating properties of rhyolite pumice soils.

Artificial Regeneration of Previously Unentered Stands. Harvest and slash treatment will provide sufficient site preparation (scarification) if planting is to follow these activities. If not, scarification prior to planting is required. Appropriate prescriptions are harvest shelterwood, harvest clear-cut or partial cut to meet wildlife objectives. Harvest only where rhyolite pumice is 6 inches thick or less over a buried profile.

Artificial Regeneration of Previously Entered Stands - Additional site preparation after harvest and slash treatment is required prior to planting. Harvest clear-cut is the appropriate prescription. Harvest only where rhyolite is 6 inches thick or less over a buried profile.

Opportunity for Species Conversion - None, regenerate to lodgepole.

Planting Prescription - Soil surface layer of rhyolite pumice is generally less than 6 inches deep overlaying Mazama pumice. The auger planting method should be used to mix the rhyolite with Mazama pumice. Where rhyolite pumice layer is too thick for mixing with the Mazama pumice below, no planting should be done.

Plantation Management - Control dwarfmistletoe within and along edge of plantation within 10 years of planting. Pocket gophers are generally not a problem. Deer and livestock protection for planted seedlings may be required until trees are 3 to 4 feet tall.

Plant Community

Lodgepole/grouse huckleberry (CLS4-16 p. 51)

General - These are cold, high elevation sites. Community found along crest of Cascades on Deschutes and Winema National Forests and higher peaks to east.

Natural Regeneration - Regeneration is unreliable due to cold sites and short growing season.

Artificial Regeneration of Previously Unentered Stands - Harvest and slash treatment will provide sufficient site preparation if planting is to immediately follow. If not, scarification prior to planting is required. Appropriate prescriptions are harvest shelterwood and harvest clear-cut.

Artificial Regeneration of Previously Entered Stands - Additional site preparation following harvest and slash treatment is required prior to planting. Appropriate prescriptions are harvest shelterwood and harvest clear-cut.

Opportunity for Species Conversion - Manage tolerant reproduction of mountain hemlock if already present at the time of harvest; otherwise, lodgepole pine is preferred species.

Planting Prescription - Soil depth is normally sufficient for planting. Auger planting should occur in the spring. Mix shallow A1 + AC horizon with coarse C horizon material.

Plantation Management - Frost protection may require rigid vexar for seedlings. Mistletoe and pocket gophers are not a problem.

Plant Community

Lodgepole/beargrass (CLM4-11 p. 52)

General - Community found along crest of Cascades on Deschutes National Forest. Environment generally cold with short growing season. Clearcutting, burning and site scarification stimulates long-stolon sedge.

Natural Regeneration - Possible within 10 years provided sufficient seed source is left and scarification occurs immediately prior to seed fall. Appropriate prescription is harvest seed cut or shelterwood of more tolerant species.

Artificial Regeneration in Previously Unentered Stands - Scarification in addition to harvest and slash treatment is required for control of brackenfern and long-stolon sedge. Harvest clear-cut is the appropriate prescription.

Artificial Regeneration in Previously Entered Stands - Additional site preparation following harvest and slash treatment is required prior to planting. Harvest clearcut is recommended.

Opportunity for Species Conversion - Manage for more tolerant mountain hemlock, subalpine fir or white pine where residuals are available. Otherwise regenerate to lodgepole pine.

Planting Prescription - Soil is normally of adequate depth and texture for planting. Machine or auger planting in the spring is recommended.

Plantation Management - Pocket gopher preference for this community will require control efforts.

Plant Community

Lodgepole/snowbrush-manzanita (CLS9-11 p. 45)

General - Community is found on Deschutes, Winema and Fremont National Forests and is a seral representation of the mixed conifer/snowbrush-manzanita (CWS1-12 p. 70). Prescribed burning may be used for site preparation or maintenance of lodgepole pine in the species mix.

Natural Regeneration - Possible within 10 years when a sufficient seed source is provided and scarification occurs immediately prior to seedfall. Harvest shelterwood is the appropriate prescription, especially if more tolerant species are desired.

Artificial Regeneration in Previously Unentered Stands - Scarification in addition to harvest and slash treatment is required prior to planting. Any delay will require control of snowbrush and manzanita invasion. Harvest clear-cut is the appropriate prescription.

Artificial Regeneration in Previously Entered Stands - Same as above.

Opportunity for Species Conversion - Excellent for conversion to ponderosa pine; lodgepole is the seral tree species. White fir will sustain frost injury and is not recommended.

Planting Prescription - Soil depth is variable for planting. Depth to coarse C horizon material should be determined for each and within each unit. Auger planting should occur in the spring. More gentle slopes can be machine planted if increaser shrubs are treated prior to planting.

Plantation Management - Deer protection to planted seedlings may be required until trees are 3 to 4 feet tall. Mistletoe is locally heavy and should be removed from within and along the edges of plantations within 10 years of planting. Pocket gophers are generally not a problem.

LITERATURE CITED

- Alexander, R. R., D. Tackle and W. G. Dahms. 1967. Site indexes for lodgepole pine with corrections for stand density: methodology. USDA Forest Service Research Paper RM-29. 18 p. (Lodgepole site index source)
- Barnes, G. H. 1962. Yield of even-aged stands of western hemlock. USDA Forest Service Tech. Bull. 1273. 52 p. (Mountain hemlock site index source)
- Brickell, James E. 1968. A method for constructing site index curves from measurements of tree age and height--its application to Inland Douglas-fir. US Forest Service Research Paper INT-47. 23 p. (Douglas-fir site index east of Metolius River)
- Brickell, James E. 1966. Site index curves for Engelmann spruce in the northern and central Rocky Mountains. US Forest Service Research Note INT-42. 8 p. (Engelmann Spruce site index source)
- DeMars, D. J., F. R. Herman, and J. F. Bell. 1970. Preliminary site index curves for noble fir from stem analysis data. USDA Forest Service Research Note PNW-119. 9 p. (Shasta red fir-noble fir site index source)
- Garrison, George A., Jon M. Skovlin, and Charles E. Poulton. 1967. Northwest range-plant symbols. USDA Forest Service. Pacific Northwest Forest and Range Exp. Sta., Res. Pap. PNW-40. 121 p.
- Hall, F. C. 1973. Some implications and relationships of growth basal area to volume productivity. USFS Pacific Northwest Region 6, Portland, Oregon. 21 mimeo p.
- Hall, F. C. 1973. Plant communities of the Blue Mountains in eastern Oregon and southeastern Washington. USDA Forest Service, Pacific Northwest Region 6, Portland, Oregon R6-8200-1. 46 p.
- Hall, F. C. 1970. An ecological classification proposal and its importance in land management. USDA Forest Service Misc. Pub. 1147. p. 210-216.
- Hitchcock, C. Leo, A. Cronquist, M. Ownbey, and J. W. Thompson. 1969. Vascular plants of the Pacific Northwest. Part 1: Vascular cryptogams, gymnosperms, and monocotyledons. Univ. Wash. Press, Seattle. 914 p.
- Hitchcock, C. Leo, A. Cronquist, M. Ownbey, and J. W. Thompson. 1964. Vascular plants of the Pacific Northwest. Part 2: Salicaceae to Saxifragaceae. Univ. Wash. Press, Seattle. 597 p.
- Hitchcock, C. Leo, A. Cronquist, M. Ownbey, and J. W. Thompson. 1961. Vascular plants of the Pacific Northwest. Part 3: Saxifragaceae to Ericaceae. Univ. Wash. Press, Seattle. 614 p.

- Hitchcock, C. Leo, A. Cronquist, M. Ownbey, and J. W. Thompson. 1955. Vascular plants of the Pacific Northwest. Part 4: Ericaceae through Campanulaceae. Univ. Wash. Press, Seattle. 510 p.
- Hitchcock, C. Leo, A. Cronquist, M. Ownbey, and J. W. Thompson. 1955. Vascular plants of the Pacific Northwest. Part 5: Compositae. Univ. Wash. Press, Seattle. 343 p.
- King, James E. 1966. Site index curves for Douglas-fir in the Pacific Northwest. Weyerhaeuser Forestry Paper #8. 49 p. (Douglas-fir site index west of the Metolius River)
- Meyer, Walter H. 1961. Yield of even-aged stands of ponderosa pine. USDA Tech. Bull. 630. 59 p. (Ponderosa pine site index source)
- Peck, Morton E. 1961. A manual of the higher plants of Oregon. Binfords and Mort., Portland, Oregon. 936 p.
- Schumacher, Francis W. 1926. Yield, stand and volume tables for white fir in the California pine region. Univ. Calif. Agric. Exp. Sta. Bull. 407. 26 p. (White fir site index source)

SPECIES LIST

<u>Scientific Name</u>		<u>Alpha Code</u>	<u>Common Name</u>
<u>TREES</u>			
Abies	amabilis	ABAM	Pacific silver fir
Abies	concolor	ABCO	White fir
Abies	lasiocarpa	ABLA2	Subalpine fir
Abies	magnifica shastensis	ABMAS	Shasta red fir
Abies	procera	ABPR	Noble fir
Juniperus	occidentalis	JUOC	Western juniper
Larix	occidentalis	LAOC	Western larch
Libocedrus	decurrens	LIDE2	Incense cedar
Picea	engelmannii	PIEN	Engelmann spruce
Pinus	albicaulis	PIAL	Whitebark pine
Pinus	contorta	PICO	Lodgepole pine
Pinus	lambertiana	PILA	Sugar pine
Pinus	monticola	PIMO	Western white pine
Pinus	ponderosa	PIPO	Ponderosa pine
Populus	tremuloides	POTR	Quaking aspen
Pseudotsuga	menziesii glauca	PSMEG	Douglas-fir (interior)
Pseudotsuga	menziesii menziesii	PSMEM	Douglas-fir (coastal)
Tsuga	mertensiana	TSME	Mountain hemlock
<u>SHRUBS</u>			
Acer	circinatum	ACCI	Vine maple
Amelanchier	alnifolia	AMAL	Saskatoon serviceberry
Arctostaphylos	nevadensis	ARNE	Pinemat manzanita
Arctostaphylos	patula	ARPA	Greenleaf manzanita
Arctostaphylos	uva-ursi	ARUV	Bearberry
Artemisia	arbuscula	ARAR	Low sagebrush
Artemisia	tridentata	ARTR	Big sagebrush
Berberis	nervosa	BENE	Cascade oregongrape
Castanopsis	chrysophylla	CACH	Golden chinkapin
Ceanothus	prostratus	CEPR	Squawcarpet
Ceanothus	velutinus	CEVE	Snowbrush
Cercocarpus	ledifolius ledifolius	CELEL	Curlleaf mountainmahogany
Chimaphila	umbellata occidentalis	CHUMO	Princespine
Chrysothamnus	nauseosus	CHNA	Tall gray rabbitbrush
Chrysothamnus	viscidiflorus	CHVI	Tall green rabbitbrush
Haplopappus	bloomeri	HABL	Rabbitbrush goldenweed
Haplopappus	greenei	HAGR	Greenes goldenweed
Holodiscus	discolor	HODI	Creambush oceanspray
Leptodactylon	pungens	LEPU2	Granitegilia
Lonicera	cauriana	LOCA2	Fly honeysuckle
Lonicera	conjugalilis	LOCO	Purpleflower honeysuckle
Lonicera	involucrata	LOIN	Bearberry honeysuckle
Phyllodoce	empetriformis	PHEM	Red mountainheath
Prunus	emarginata	PREM	Bitter cherry
Purshia	tridentata	PUTR	Antelope bitterbrush
Ribes	cereum cereum	RICE	Squaw currant
Ribes	viscosissimum	RIVI	Sticky currant
Rosa	gymnocarpa	ROGY	Baldhip rose
Rubus	parviflorus	RUPA	Thimbleberry
Rubus	ursinus	RUUR	Trailing blackberry
Salix	scouleriana	SASC	Scouler willow

<u>Scientific Name</u>		<u>Alpha Code</u>	<u>Common Name</u>
<u>SHRUBS</u>			
Spirea	manziesii	SPME	Menzies spirea
Symphoricarpos	albus	SYAL	Common snowberry
Tetradymia	canescens	TECA	Gray horsebrush
Vaccinium	caespitosum	VACA	Dwarf huckleberry
Vaccinium	membranaceum	VAME	Big huckleberry
Vaccinium	occidentale	VAOC	Westernbog blueberry
Vaccinium	scoparium	VASC	Grouse huckleberry
<u>GRASSES</u>			
Agropyron	desertorum	AGDE	Standard crested wheatgrass
Agropyron	intermedium	AGIN2	Intermediate wheatgrass
Agropyron	spicatum	AGSP	Bluebunch wheatgrass
Agropyron	trachycaulum	AGTR	Slender wheatgrass
Agropyron	trichophorum	AGTR2	Pubescent wheatgrass
Agrostis	scabra	AGSC	Rough bentgrass
Alopecurus	pratensis	ALPR	Meadow foxtail
Bromus	commutatus	BRCO	Hairy brome
Bromus	inermis	BRIN	Smooth brome
Bromus	marginatus	BRMA	Mountain brome
Bromus	tectorum	BRTE	Cheatgrass brome
Bromus	vulgaris	BRVU	Columbia brome
Calamagrostis	canadensis	CACA	Bluejoint reedgrass
Calamagrostis	inexpansa	CAIN	Northern reedgrass
Calamagrostis	rubescens	CARU	Pinegrass
Dactylis	glomerata	DAGL	Orchardgrass
Danthonia	californica	DACA	California oatgrass
Danthonia	intermedia	DAIN	Timber oatgrass
Danthonia	unispicata	DAUN	Onespike oatgrass
Deschampsia	caespitosa	DECA	Tufted hairgrass
Deschampsia	danthonioides	DEDA	Annual hairgrass
Elymus	glaucus	ELGL	Blue wildrye
Festuca	arundinacea	FEAR3	Alta fescue
Festuca	microstachys	FEMI	Small fescue
Festuca	occidentalis	FEOC	Western fescue
Festuca	ovina duriuscula	FEOVD	Hard fescue
Festuca	reflexa	FERE	Twoflower fescue
Festuca	rubra commutata	FERUC	Chewings fescue
Hordeum	nodosum	HONO	Meadow barley
Koeleria	cristata	KOCR	Prairie junegrass
Melica	aristata	MEAR	Bearded melic
Muhlenbergia	asperifolia	MUAS	Alkali muhly
Muhlenbergia	filiformis	MUFI	Pullup muhly
Muhlenbergia	richardsonis	MURI	Mat muhly
Phalaris	arundinacea	PHAR	Reed canarygrass
Phleum	alpinum	PHAL	Alpine timothy
Phleum	pratense	PHPR	Timothy
Poa	ampla	POAM	Sherman big bluegrass
Poa	cusickii	POCU	Cusick bluegrass
Festuca	idahoensis	FEID	Idaho fescue

<u>Scientific Name</u>		<u>Alpha Code</u>	<u>Common Name</u>
<u>GRASSES</u>			
Poa	nervosa	PONE	Wheeler bluegrass
Poa	nevadensis	PONE2	Nevada bluegrass
Poa	pratensis	POPR	Kentucky bluegrass
Poa	secunda	POSE	Sandberg bluegrass
Sitanion	hystrix	SIHY	Bottlebrush squirreltail
Stipa	occidentalis	STOC	Western needlegrass
Stipa	thurberiana	STTH	Thurber needlegrass
Stipa	williamsii	STWI	Williams needlegrass
<u>SEDGES and RUSHES</u>			
Carex	athrostachya	CAAT	Slenderbeak sedge
Carex	buxbaumii	CABU3	Buxbaum sedge
Carex	filifolia	CAFI	Threadleaf sedge
Carex	lasiocarpa	CALA4	Slender bog sedge
Carex	nebraskensis	CANE	Nebraska sedge
Carex	pachystachya	CAPA	Chamisso sedge
Carex	pennsylvanica	CAPE1	Long-stolon sedge
Carex	preslii	CAPR	Presl sedge
Carex	rossii	CARO	Ross sedge
Carex	simulata	CASI2	Analogue sedge
Juncus	balticus	JUBA	Baltic rush
Juncus	drummondii	JUDR	Drummond rush
Juncus	nevadensis	JUNE	Nevada rush
Juncus	orthophyllus	JUOR	Straight-leaf rush
Luzula	glabrata	LUGL	Smooth woodrush
<u>FORBS</u>			
Achillea	millefolium lanulosa	ACMIL	Western yarrow
Adenocaulon	bicolor	ADBI	Adenocaulon
Agoseris	glauca	AGGL	Pale agoseris
Antennaria	corymbosa	ANCO2	Flattop pussytoes
Antennaria	dimorpha	ANDI	Low pussytoes
Antennaria	geyeri	ANGE2	Pinewoods pussytoes
Antennaria	rosea	ANRO	Rose pussytoes
Apocynum	androsaemifolium pumilum	APANP	Low dogbane
Aquilegia	formosa	AQFO	Sitka columbine
Arabis	holboellii	ARHO	Holboell rockcress
Arabis	platysperma howellii	ARPLH	Broadseed rockcress
Arabis	suffrutescens	ARSU2	Woody rockcress
Arenaria	spp.	AREZ	Sandwort
Arnica	fulgens	ARFU	Orange arnica
Aster	canescens	ASCA	Hoary aster
Aster	ledophyllus	ASLE2	Cascades aster
Aster	occidentalis	ASOC	Western aster
Aster	radulinus	ASRA	Rough-leaf aster
Balsamorhiza	careyana	BACA	Carey balsamroot
Balsamorhiza	sagittata	BASA	Arrowleaf balsamroot
Castilleja	aplegatei	CAAP2	Aplegate paintbrush
Castilleja	miniata	CAMI2	Scarlet paintbrush

<u>Scientific Name</u>		<u>Alpha Code</u>	<u>Common Name</u>
<u>FORBS</u>			
Clarkia	rhomboidea	CLRH	Clarkia
Clintonia	uniflora	CLUN	Queencup beadlely
Cynoglossum	occidentale	CYOC	Western houndstongue
Epilobium	angustifolium	EPAN	Fireweed
Epilobium	watsonii	EPWA	Watson willowweed
Erigeron	filifolius	ERFI	Threadleaf fleabane
Eriogonum	compositum	ERCO5	Northern buckwheat
Eriogonum	heracleoides	ERHE	Wyeth buckwheat
Eriogonum	ovalifolium	EROV	Cushion buckwheat
Eriogonum	umbellatum	ERUM	Sulfur buckwheat
Eriophyllum	lanatum achillaeoides	ERLAA	Woolly eriophyllum
Fragaria	virginiana platypetala	FRVIP	Broadpetal strawberry
Galium	boreale	GABO	Northern bedstraw
Galium	triflorum	GATR	Sweetscented bedstraw
Gnaphalium	spp.	GNAZ	Cudweed
Goodyera	oblongifolia	GOOB	Rattlesnake plantain
Hackelia	floribunda	HAFL	Showy stickweed
Hieracium	albiflorum	HYAL	White hawkweed
Hieracium	cynoglossoides	HICY	Houndstongue hawkweed
Hieracium	gracile	HIGR	Slender hawkweed
Hieracium	scouleri	HISC	Scouler's hawkweed
Horkelia	fusca capitata	HOFUC	Tawny horkelia
Kelloggia	galioides	KEGA	Kelloggia
Lathyrus	lanswertii	LALA2	Thickleaf peavine
Lilium	washingtonianum	LIWA	Washington lily
Linanthastrum	nuttallii	LINU	Linanthastrum
Linnaea	borealis americana	LIBOA	Twinflower
Linum	perenne	LIPE	Perennial flax
Lithospermum	ruderales	LIRU	Western gromwell
Lomatium	nudicaule	LONU	Barestem lomatium
Lomatium	simplex	LOSI	Narrowleaf lomatium
Lomatium	triternatum	LOTR	Nineleaf lomatium
Lupinus	andersoni	LUAN	Pine lupine
Lupinus	argenteus	LUAR	Silvery lupine
Lupinus	caudatus	LUCA	Tailcup lupine
Lupinus	lepidus aridus	LULEA	Least lupine
Lupinus	lepidus lobbii	LULEL2	Least lupine
Mentzelia	albicaulis	MEAL2	Whitestem mentzelia
Mimulus	breweri	MIBR2	Brewer monkeyflower
Osmorhiza	chilensis	OSCH	Mountain sweetanise
Penstemon	cinicola	PECI	Smallflower penstemon
Penstemon	euglaucus	PEEU	Glaucous penstemon
Penstemon	humilis	PEHU	Low penstemon
Phacelia	hastata leucophylla	PHHAL	Whiteleaf phacelia
Potentilla	anserina	POAN2	Silverweed
Potentilla	glandulosa	POGL	Gland cinquefoil
Potentilla	gracilis glabrata	POGRG	Slender cinquefoil
Pteridium	aquilinum pubescens	PTAQP	Brackenfern

<u>Scientific Name</u>		<u>Alpha Code</u>	<u>Common Name</u>
<u>FORBS</u>			
Pterospora	andromeda	PTAN	Woodland pinedrops
Pyrola	dentata	PYDE	Toothleaf pyrola
Pyrola	picta	PYPI	Whitevein pyrola
Pyrola	secunda	PYSE	Sidebells pyrola
Ranunculus	alismaefolius	RAAL	Plaintainleaf buttercup
Ranunculus	occidentalis	RAOC	Western buttercup
Senecio	canus	SECA	Woolly groundsel
Senecio	integerrimus exaltatus	SEINE	Western groundsel
Senecio	serra	SESE	Butterweed groundsel
Senecio	triangularis	SETR	Arrowleaf groundsel
Smilacina	stellata	SMST	Starry solomonplume
Spraguea	umbellata	SPUM	Umbellate pussypaws
Stephanomeria	lactucina	STLA	Skeleton weed
Taraxacum	officinale	TAOF	Common dandelion
Trientalis	latifolia	TRLA	Western starflower
Trifolium	longipes	TRLO	Longstem clover
Trifolium	repens	TRRE	White clover
Trifolium	wormskjoldi	TRW02	Springbank clover
Viola	nuttallii	VINU	Nuttall violet
Viola	purpurea	VIPU	Goosefoot violet
Xerophyllum	tenax	XETE	Beargrass
<u>PATHOGENS</u>			
Arceuthobium	americanum		Dwarfmistletoe (lodgepole pine)
Arceuthobium	campylopodum f. abietinum		Dwarfmistletoe (white fir)
Arceuthobium	campylopodum f. campylopodum		Dwarfmistletoe (ponderosa pine)
Arceuthobium	campylopodum f. laricis		Dwarfmistletoe (western larch)
Arceuthobium	douglasii		Dwarfmistletoe (Douglas-fir)
Cronartium	comandrae		Comandra rust
Elytroderma	deformans		Elytroderma needlecast
Enchinodontium	tinctorium		Indian paint fungus
Endocronartium	harknessii		Western gall rust
<u>INSECTS</u>			
Dendroctonus	brevicomis		Western pine beetle
Eucosma	sonomana		Western pine shootborer
<u>MAMMALS</u>			
Thomomys	talpoides		Northern pocket gopher

SPECIES LIST
(By Common Name)

<u>Common Name</u>	<u>Scientific Name</u>	
<u>TREES</u>		
Douglas-fir (coastal)	Pseudotsuga	menziesii menziesii
Douglas-fir (interior)	Pseudotsuga	menziesii glauca
Engelmann spruce	Picea	engelmannii
Incense cedar	Libocedrus	decurrens
Lodgepole pine	Pinus	contorta
Mountain hemlock	Tsuga	mertensiana
Noble fir	Abies	procera
Pacific silver fir	Abies	amabilis
Ponderosa pine	Pinus	ponderosa
Quaking aspen	Populus	tremuloides
Shasta red fir	Abies	magnifica shastensis
Subalpine fir	Abies	lasiocarpa
Sugar pine	Pinus	lambertiana
Western juniper	Juniperus	occidentalis
Western larch	Larix	occidentalis
Western white pine	Pinus	monticola
White fir	Abies	concolor
Whitebark pine	Pinus	albicaulis
<u>SHRUBS</u>		
Antelope bitterbrush	Purshia	tridentata
Baldhip rose	Rosa	gymnocarpa
Bearberry	Arctostaphylos	uva-ursi
Bearberry honeysuckle	Lonicera	involutrata
Big huckleberry	Vaccinium	membranaceum
Big sagebrush	Artemisia	tridentata
Bitter cherry	Prunus	emarginata
Cascade oregongrape	Berberis	nervosa
Common snowberry	Symphoricarpos	albus
Creambush oceanspray	Holodiscus	discolor
Curlleaf mountainmahogany	Cercocarpus	ledifolius ledifolius
Dwarf huckleberry	Vaccinium	caespitosum
Fly honeysuckle	Lonicera	cauriana
Golden chinkapin	Castanopsis	chrysophylla
Granitegilia	Leptodactylon	pungens
Gray horsebrush	Tetradymia	canescens
Greenleaf manzanita	Arctostaphylos	patula
Greenes goldenweed	Haplopappus	greenei
Grouse huckleberry	Vaccinium	scoparium
Low sagebrush	Artemisia	arbuscula
Menzies spirea	Spirea	menziesii
Pinemat manzanita	Arctostaphylos	nevadensis
Princespine	Chimaphila	umbellata occidentalis
Purpleflower honeysuckle	Lonicera	conjugalis
Rabbitbrush goldenweed	Haplopappus	bloomeri

Common NameScientific NameSHRUBS

Red mountainheath
Saskatoon serviceberry
Sculer willow
Squawcarpet
Squaw currant
Snowbrush
Sticky currant
Tall gray rabbitbrush
Tall green rabbitbrush
Thimbleberry
Trailing blackberry
Vine maple
Westernbog blueberry

Phyllodoce	empetriformis
Amelanchier	alnifolia
Salix	scouleriana
Ceanothus	prostratus
Ribes	cereum cereum
Ceanothus	velutinus
Ribes	viscosissimum
Chrysothamnus	nauseosus
Chrysothamnus	viscidiflorus
Rubus	parviflorus
Rubus	ursinus
Acer	circinatum
Vaccinium	occidentale

GRASSES

Alkali muhly
Alpine timothy
Alta fescue
Annual hairgrass
Bearded melic
Blue wildrye
Bluebunch wheatgrass
Bluejoint reedgrass
Bottlebrush squirreltail
California oatgrass
Cheatgrass brome
Chewings fescue
Columbia brome
Cusick bluegrass
Hairy brome
Hard fescue
Intermediate wheatgrass
Kentucky bluegrass
Mat muhly
Meadow barley
Meadow foxtail
Mountain brome
Nevada bluegrass
Northern reedgrass
Onespike oatgrass
Orchardgrass
Pinegrass
Prairie junegrass
Pubescent wheatgrass
Pullup muhly
Reed canarygrass
Rough bentgrass
Sandberg bluegrass
Sherman big bluegrass
Slender wheatgrass

Muhlenbergia	asperifolia
Phleum	alpinum
Festuca	arundinacea
Deschampsia	danthonioides
Melica	aristata
Elymus	glaucus
Agropyron	spicatum
Calamagrostis	canadensis
Sitanion	hystrix
Danthonia	californica
Bromus	tectorum
Festuca	rubra commutata
Bromus	vulgaris
Poa	cusickii
Bromus	commutatus
Festuca	ovina duriuscula
Agropyron	intermedium
Poa	pratensis
Muhlenbergia	richardsonis
Hordeum	nodosum
Alopecurus	pratensis
Bromus	marginatus
Poa	nevadensis
Calamagrostis	inexpansa
Danthonia	unispicata
Dactylis	glomerata
Calamagrostis	rubescens
Koeleria	cristata
Agropyron	trichophorum
Muhlenbergia	filiformis
Phalaris	arundinacea
Agrostis	scabra
Poa	secunda
Poa	ampla
Agropyron	trachycaulum

Common Name

Small fescue
 Smooth brome
 Standard crested wheatgrass
 Thurber needlegrass
 Timber oatgrass
 Timothy
 Tufted hairgrass
 Twoflower fescue
 Western fescue
 Western needlegrass
 Wheeler bluegrass
 Williams needlegrass

SEDGES and RUSHES

Analogue sedge
 Baltic rush
 Buxbaum sedge
 Chamisso sedge
 Drummond rush
 Long-stolon sedge
 Nebraska sedge
 Nevada rush
 Presl sedge
 Ross sedge
 Slenderbeak sedge
 Slender bog sedge
 Straight-leaf rush
 Smooth woodrush
 Threadleaf sedge

FORBS

Adenocaulon
 Applegate paintbrush
 Arrowleaf balsamroot
 Arrowleaf groundsel
 Barestem lomatium
 Beargrass
 Brackenfern
 Brewer monkeyflower
 Broadpetal strawberry
 Broadseed rockcress
 Butterweed groundsel
 Carey balsamroot
 Cascades aster
 Clarkia
 Common dandelion
 Cudweed
 Cushion buckwheat
 Fireweed

Scientific Name

Festuca microstachys
 Bromus inermis
 Agropyron desertorum
 Stipa thurberiana
 Danthonia intermedia
 Phleum pratense
 Deschampsia caespitosa
 Festuca reflexa
 Festuca occidentalis
 Stipa occidentalis
 Poa nervosa
 Stipa williamsii

Carex simulata
 Juncus balticus
 Carex buxbaumii
 Carex pachystachya
 Juncus drummondii
 Carex pensylvanica
 Carex nebraskensis
 Juncus nevadensis
 Carex preslii
 Carex rossii
 Carex athrostachya
 Carex lasiocarpa
 Juncus orthophyllus
 Luzula glabrata
 Carex filifolia

Adenocaulon bicolor
 Castilleja applegatei
 Balsamorhiza sagittata
 Senecio triangularis
 Lomatium nudicaule
 Xerophyllum tenax
 Pteridium aquilinum pubescens
 Mimulus breweri
 Fragaria virginiana platypetala
 Arabis platysperma howellii
 Senecio serra
 Balsamorhiza careyana
 Aster ledophyllus
 Clarkia rhomboidea
 Taraxacum officinale
 Gnaphalium spp.
 Eriogonum ovalifolium
 Epilobium angustifolium

Common NameScientific NameFORBS

Flattop pussytoes
 Gland cinquefoil
 Glaucous penstemon
 Goosefoot violet
 Hoary aster
 Holboell rockcress
 Houndstongue hawkweed
 Kelloggia
 Least lupine
 Least lupine
 Linanthastrum
 Longstem clover
 Low dogbane
 Low penstemon
 Low pussytoes
 Mountain sweetanise
 Narrowleaf lomatium
 Nineleaf lomatium
 Northern bedstraw
 Northern buckwheat
 Nuttall violet
 Orange arnica
 Pale agoseris
 Perennial flax
 Pine lupine
 Pinewoods pussytoes
 Plaintainleaf buttercup
 Queencup beardless
 Rattlesnake plantain
 Rose pussytoes
 Rough-leaf aster
 Sandwort
 Scarlet paintbrush
 Scouler's hawkweed
 Showy stickweed
 Sidebells pyrola
 Silverweed
 Silvery lupine
 Sitka columbine
 Skelton weed
 Slender cinquefoil
 Slender hawkweed
 Smallflower penstemon
 Springbank clover
 Starry solomonplume
 Sweetscented bedstraw
 Sulfur buckwheat
 Tailcup lupine
 Tawny horkelia
 Thicketleaf peavine

Antennaria	corymbosa
Potentilla	glandulosa
Penstemon	euglaucus
Viola	purpurea
Aster	canescens
Arabia	holboellii
Hieracium	cynoglossoides
Kelloggia	galioidea
Lupinus	lepidus aridus
Lupinus	lepidus lobbii
Linanthastrum	nuttallii
Trifolium	longipes
Apocynum	androsaemifolium pumilum
Penstemon	humilis
Antennaria	dimorpha
Osmorhiza	chilensis
Lomatium	simplex
Lomatium	triternatum
Galium	boreale
Eriogonum	compositum
Viola	nuttallii
Arnica	fulgens
Agoseris	glauca
Linum	perenne
Lupinus	andersoni
Antennaria	geyeri
Ranunculus	alismaefolius
Clintonia	uniflora
Goodyera	oblongifolia
Antennaria	rosea
Aster	radulinus
Arenaria	spp.
Castilleja	miniata
Hieracium	scouleri
Hackelia	floribunda
Pyrola	secunda
Potentilla	anserina
Lupinus	argenteus
Aquilegia	formosa
Stephanomeria	lactucina
Potentilla	gracilis glabrata
Hieracium	gracile
Penstemon	cinicola
Trifolium	wormskjoldi
Smilacina	stellata
Galium	triflorum
Eriogonum	umbellatum
Lupinus	caudatus
Horkelia	fusca capitata
Lathyrus	lanszwertii

Common Name

Scientific Name

FORBS

Threadleaf fleabane	Erigeron	filifolius
Toothleaf pyrola	Pyrola	dentata
Twinflower	Linnaea	borealis americana
Umbellate pussypaws	Spraguea	umbellata
Washington lily	Lilium	washingtonianum
Watson willowweed	Epilobium	watsonii
Western aster	Aster	occidentalis
Western buttercup	Ranunculus	occidentalis
Western growwell	Lithospermum	ruderales
Western groundsel	Senecio	intergerrimus exaltatus
Western houndstongue	Cynoglossum	occidentale
Western starflower	Trientalis	latifolia
Western yarrow	Archillea	millefolium lanulosa
White clover	Trifolium	repens
White hawkweed	Hieracium	albiflorum
Whiteleaf phacelia	Phacelia	hastata leucophylla
Whitestem mentzelia	Mentzelia	albicaulis
Whitevein pyrola	Pyrola	picta
Woodland pinedrops	Pterospora	andromeda
Woody rockcress	Arabis	suffrutescens
Woolly eriophyllum	Eriophyllum	lanatum archillaeoides
Wooly groundsel	Senecio	canus
Wyeth buckwheat	Eriogonum	heracleoides

VEGETATION-SITE KEY TO SERAL VEGETATION WITHIN SO. CENTRAL OREGON PUMICE

The following vegetation-site key to plant associations within south-central Oregon pumice zone is based on species found in very early to mid-seral stages of stand development. The key applies to stands which have been either logged, burned, overgrazed, scarified with heavy equipment, or reseeded. The indicator species used are those whose mode of regeneration and resiliency to disturbance permit them to survive a catastrophic event. Other criteria for indicator species were their potential occurrence in all stages of succession, their affinity to certain topo-edaphic environmental conditions, and their geographic distribution. Soil and topography criteria have been used as differentiating attributes whenever possible. Knowledge of water table depths during the growing season, kind of pumice parent material, landform configurations and elevation zones are fundamental to use of the key.

The key is subdivided into two parts based upon whether the stand in question has ever been forested. The presence of tree stumps, tree regeneration or knowledge that the area lies within the forest zone will direct the user to the forested site key. Absence of stumps or tree regeneration direct the user to the nonforest section of the key. The purpose of the key is to identify the most likely plant association(s) which occur on a site. The user then reads the modal descriptions for the candidate associations and makes an intelligent choice between them. Each plant community listed in the key is delineated by the common name of the diagnostic species, the association designation, ecoclass identification code and page where typical description can be found in the publication PLANT ASSOCIATIONS OF THE CENTRAL OREGON PUMICE ZONE.

VEGETATION-SITE KEY TO NONFOREST VEGETATION OF CENTRAL OREGON PUMICE

- 1a. Tree stumps, natural or artificially established young trees present.
Trees represented by any one of following species: lodgepole pine, ponderosa pine, Douglas-fir, white fir, Shasta red fir, mountain hemlock.

(refer to seral key for
forest vegetation p.)

- 1b. Tree stumps and young trees of previously mentioned species are absent.
Highly disturbed sites may lack shrub layer due to burning or logging, or the herbaceous layer dominates due to site potential.

- 2a. Water standing on or within 3 feet of soil surface through mid-summer.
Orange arnica, Watson willoweed, cudweed or silverweed present.

- 3a. Remnant of sedges and rushes present. Mat muhly and Kentucky bluegrass absent.

Wet meadow
Community type
MW p. 20

- 3b. Tufted hairgrass present and associated with Nebraska sedge and/or mat muhly and Kentucky bluegrass.

Moist (hairgrass) meadow
Community type
MM-19 p. 21

- 2b. Soil surface moist to dry by mid-summer. Water table absent or below 3 feet by mid-summer.

- 4a. Western yarrow, dandelion, aster, pussytoes, clover or strawberry common. Site characterized by bottom slope positions of drainages and basins. Surface rock occasional to absent.

- 5a. Nevada and Cusicks bluegrass occur as remnants. Mat muhly and Kentucky bluegrass rare to absent.

Dry meadow
Community type
MD19-11 p. 23

- 5b. Nevada and Cusicks bluegrass absent, slender wheatgrass or Prairie junegrass occasional. Mat muhly and Kentucky bluegrass common.

Moist (bluegrass) meadow
Community type
MM-90 p. 22

- 4b. Western yarrow, dandelion, aster, pussytoes, clover or strawberry rare to absent. Soils very shallow, surface rock common. Site of lower to upper-third positions of ridges, benches or escarpments.

- 6a. Barestem lomatium, small fescue, annual hairgrass or hairy brome present. Sandberg bluegrass remnants may be present.

Bluegrass scabland
Community type
GB-99 p. 24

- 6b. Barestem lomatium, small fescue, annual hairgrass or hairy brome absent. Western needlegrass, squirreltail, sedge and/or Idaho fescue and bluebunch wheatgrass present, at least as remnants.

7a. Soil surface covered with rhyolite popcorn-size pumice from Newberry Caldera. Pumice deposit at least 6 inches thick over a buried soil profile. Stands restricted to Ft. Rock RD.

8a. Horsebrush, graminifolia, wooly groundsel, Brewer monkeyflower, umbellate pussypaws common. Big sagebrush absent.

Buckwheat flats (rhyolite)
Association
SD93-23 p. 30

8b. Horsebrush and associated species listed above are very rare or absent. Grey rabbitbrush, least lupine, hoary aster, annual phacelia, microsteris and barestem gayophytum common. Big sagebrush present, or as remnants unless site has been recently burned or sprayed.

Big sagebrush/needlegrass
(rhyolite)
Association
SD29-14 p. 27

7b. Soil surface not covered with rhyolite pumice from Newberry Caldera nor this pumice, if present, at least 6 inches thick.

9a. Soils developed from very sandy glacial outwash or windblown beach sand. Stands restricted to Chemult and Chiloquin RD. Grey rabbitbrush and goldenweed common or herbaceous layer dominated by long-stolon sedge, western needlegrass, goosefoot violet, Geyer's antennaria or dwarf skullcap.

Bitterbrush/needlegrass-sedge
Association
SD33-11 p. 29

9b. Soils developed from air-laid pumice from Mt. Mazama or andesite-basalt residuum. Stands found throughout pumice zone.

10a. Snowbrush and/or greenleaf manzanita common. Stand history is severe burning or scarification during logging.

Brushfields with forest
site potential
SC
(refer to seral key to
forested vegetation even
though tree stumps may be
absent. see p. 127)

10b. Dominant shrubs appear to be bitterbrush, goldenweed and/or sagebrush, if shrubs represented at all.

11a. Stands located well within forest zone, usually surrounded by forest or remnant tree stumps present. Sites occasionally seeded with intermediate wheatgrass, orchardgrass, timothy, smooth brome and/or hard fescue.

(Refer to seral key to
forested vegetation. see p. 127)

11b. Stands located below forest zone or within forest savanna of Silver Lake, Ft. Rock, Sisters, Bly or Chiloquin RD. Idaho fescue and/or bluebunch wheatgrass present unless severely overgrazed or burned. Highly disturbed sites occupied by annuals as cheatgrass, linanthus, cryptantha, microsteris, and collomia. Sites occasionally reseeded with crested wheatgrass.

12a. Topography of escarpments, buttes, cinder cones, mountain sideslopes. Soil depth to bedrock exceeds 25 inches. Big sagebrush present. Highly disturbed stands dominated by Wyeth buckwheat, green or grey rabbitbrush, Clarkia, woolly groundsel and tailcup lupine.

13a. Stands generally within Forest savanna but lack evidence of ponderosa pine. Juniper, if present, with less than 10 sq. ft. basal area. Bitterbrush can be present unless stand is severely burned or grazed. Grey rabbitbrush common.

Big sagebrush-bitterbrush/
bunchgrass.

Association
SD29-13 p. 28

13b. Stands located below or beyond forest savanna with no evidence of bitterbrush or western juniper. Green rabbitbrush or goldenwed evident.

Big sagebrush/bunchgrass
Association

SD29-12 p. 26

Under highly disturbed conditions SD29-12 and SD29-13 are very difficult to separate in early seral stages. The most obvious difference being their geographic location and the ability to support bitterbrush and western juniper as succession progresses).

12b. Topography is undulating to rolling plateaus, broad ridgelines or basins. Soil depth to bedrock is less than 25 inches. Big sagebrush is absent. Highly disturbed stands dominated by rabbitbrush, Sandberg bluegrass, low pussytoes.

14a. Western juniper as dead remnants or live trees with greater than 20 sq. ft. basal area of overstory trees, or canopy cover exceeding 5 percent in either layer. Low sagebrush absent. Bitterbrush present unless severely burned or grazed.

Juniper/bitterbrush/bunchgrass
Association

CJ53-11 p. 31

14b. Western juniper is less than 10 sq. ft. basal area of overstory trees or juniper cover is less than 5 percent in either layer. Low sagebrush present or as dead remnants. Bitterbrush, when present, has less than 3 percent cover.

Low sagebrush/fescue
Association

SD19-12 p. 25

SERIAL-VEGETATION-SITE KEY TO FORESTED VEGETATION OF CENTRAL OREGON PUMICE

1a. Idaho fescue present, or decadent large bunchgrass apparent.

2a. Slopes generally less than 5 percent, flat to concave basins or drainages surrounding elevated ground. Soils imperfectly drained through early summer; soil colors are grey tones.

3a. Remnant living or dead bitterbrush present.

Lodgepole/bitterbrush/fescue
Association
CLS2-14 p. 49

3b. Bitterbrush absent, even in protected microsites.

Lodgepole/fescue
Community type
CLG3-12 p. 49

2b. Site generally well-drained through most of growing season. Soil colors grey to yellow brown. Slopes, macrotopography and landform various.

4a. Soils derived from airlaid rhyolite pumice gravels from Newberry Caldera or these white-gray gravels obvious on the soil surface. Stands restricted to Ft. Rock RD.

Lodgepole/sagebrush/fescue
Association
CLS1-11 p. 37

4b. Soils derived from airlaid or flow pumice from Mt. Mazama. Pumice gravels are buff yellow, yellow-brown or pink.

5a. Snowbrush dominates the shrub layer.

6a. Thicket leaf peavine present.

Ponderosa/sedge-fescue-peavine
Association
CPG2-12 p. 66

6b. Thicket leaf peavine absent.

Ponderosa/bitterbrush-snowbrush
fescue
Association
CPS3-14 p. 59

5b. Snowbrush absent or subordinate to other shrubs, if shrub layer present at all.

7a. Big sagebrush present, at least as remnants or decadent individuals.

Ponderosa/bitterbrush-sagebrush/
fescue
Association
CPS1-11 p. 56

7b. Big sagebrush absent.

8a. Bitterbrush present, can be as remnants or decadent plants.

9a. Bluebunch wheatgrass present.

Ponderosa/bitterbrush/bunchgrass
Association
CPS2-16 p. 53

9b. Bluebunch wheatgrass absent.

10a. Greenleaf manzanita dominant.

Ponderosa/bitterbrush-manzanita/
fescue
Association
CPS2-17 p. 58

10b. Greenleaf manzanita very subordinate to other shrubs or
absent.

Ponderosa/bitterbrush/fescue
Association
CPS2-11 p. 57

or Lodgepole/bitterbrush/fescue
Association
CLS2-14 p. 39

8b. Bitterbrush absent.

11a. Thicket leaf peavine present. Stands restricted to Sisters RD.

Ponderosa/sedge-fescue-peavine
Association
CPG2-12 p. 66

11b. Thicket leaf peavine absent. Stands with more general distribution.

Ponderosa/fescue
Association
CPG3-11 p. 57

or Lodgepole/fescue
Community type
CLG3-12

(Lodgepole sites separated from
ponderosa sites by topographic
position, size, and species of
stumps. Lodgepole occupies
lower third and bottom positions
of local topography.)

1b. Idaho fescue absent.

12a. Slopes generally less than 5 percent, flat to concave basins or
drainages surrounding elevated ground. Soils imperfectly drained
through early summer; soil colors are grey tones.

13a. Bearberry present.

Lodgepole/bearberry
Association
CLM2-11 p. 34

13b. Bearberry absent.

14a. Blueberry, honeysuckle or spirea present.

Lodgepole/blueberry wetland
Association
CLM3-11 p. 33

14b. Blueberry, honeysuckle or spirea absent.

15a. Nebraska sedge, slender bog sedge, northern reedgrass and/or blue wildrye present. Kentucky bluegrass, mat muhly or western yarrow absent. Tree stumps can be present.

Lodgepole/sedge-grass wetland
Association
CLM1-11 p. 32

15b. Nebraska sedge, slender bog sedge, northern reedgrass and/or blue wildrye absent. Kentucky bluegrass, mat muhly, western yarrow present. Pole to large sawtimber stumps absent.

16a. Twinflower and/or trailing blackberry present.
Topography typically of glacial outwash plains of Sister and Bend RD.

Mixed conifer/snowberry/twinflower
flatlands
Association
CDS6-12 p. 78

or Englemann Spruce Bottomlands
Community type
CWS9-11 p. 79

(Main separation is the prevalent of Englemann spruce in CWS9-11) which could possibly be a seral community to CDS6-12.

16b. Twinflower and trailing blackberry absent. Topography typically basins, flats, and drainages with alluvial pumice sands and gravels. Locations various.

Lodgepole invasion into
meadows
CLM9

12b. Site generally well-drained through most of growing season. Soil colors grey to yellow brown. Slopes, macrotopography and landform various.

17a. Long stolon sedge present. Western needlegrass, squirreltail or pinegrass subordinate to codominant with sedge.

18a. Snowbrush and/or greenleaf manzanita present.

19a. Brackenfern present.

20a. Golden chinkapin present as sproats or older plants. Strawberry and princespine present, at least as remnants. Long-stolon sedge subordinate to needlegrass, squirreltail, Ross sedge if present at all.

Mixed conifer/snowbrush-chinkapin/
brackenfern
Association
CWC2-11 p. 75

20b. Golden chinkapin, strawberry, and princespine absent. Long stolon sedge dominant or at least codominant with needlegrass and squirreltail.

Mixed conifer/snowbrush/sedge-
brackenfern

Association

CWC2-13 p. 69

19b. Brackenfern absent.

21a. Glauous (Graycoys) penstemon present.

Mixed conifer/snowbrush-mazanita/
sedge-penstemon

Association

CWS1-13 p. 71

or Lodgepole/sedge-lupine-penstemon

Community type

CLG4-12 p. 47

(In highly disturbed stands
these two communities can be
separated by the size and spe-
cies of stumps. CLG4-12 tends
to occur on lower third and
flatter topography than CWS1-13,
but is also an mid-seral stage
of CWS1-13).

21b. Glauous penstemon absent.

22a. Remnant living or dead bitterbrush present.

Ponderosa/bitterbrush-snowbrush/
sedge

Association

CPS3-12 p. 65

or Ponderosa/bitterbrush-mazanita/
sedge

Association

CPS2-14 p. 64

(In highly disturbed conditions,
these two communities cannot be
separated. CPS3-12 retains a
predominance of snowbrush over
greenleaf manzanita in at least
a 60/40 ratio).

22b. Bitterbrush absent, even in protected microsites.

23a. Pinegrass present.

Mixed conifer/snowbrush-chinkapin/
pinegrass

Association

CWC2-12 p. 74

23b. Pinegrass absent.

Mixed conifer/snowbrush/sedge
Association

CWS1-15 p. 68

18b. Snowbrush and greenleaf manzanita absent.

24a. Stands occur above 4800-5000 feet elevation. Tailcup
lupine present.

25a. *Linanthastrum* present.

Lodgepole/needlegrass-lupine-
linanthastrum
Association
CLG3-13 p. 49

25b. *Linanthastrum* absent.

26a. Beargrass common.

Lodgepole/beargrass
Association
CLM4-11 p. 52

26b. Beargrass rare to absent.

27a. Grouse huckleberry common.

Lodgepole/grouse huckleberry
Community type
CLS4-12 p. 51

or Mountain hemlock/grouse
huckleberry
Association
CMS1-11 p. 80

(Differentiation between these
two communities is difficult in
early to mid-seral stages.
CLS4-12 often found on flat to
undulating convex/concave
microrelief with bottom to mid-
third slope positions. CMS1-11
usually occurs on mid to upper
third or ridge slope positions).

27b. Grouse huckleberry absent.

Lodgepole/needlegrass-lupine
Association
CLG3-14 p. 48

24b. Stands generally occur below 500 feet elevation. Tailcup
lupine absent.

28a. Silvery or Anderson lupine present.

Lodgepole/sedge-lupine
Association
CLG4-11 p. 46

28b. Silvery or Anderson lupine absent.

29a. Squaw currant at least codominant with bitterbrush in
shrub layer.

Lodgepole/currant-bitterbrush/
needlegrass
Community type
CLS2-15 p. 41

29b. Squaw currant rare if present at all.

30a. Topography as undulating to rolling plateaus
and/or slopes of buttes and cinder cones.

31a. Thicketleaf peavine present.

Ponderosa/sedge-fescue-peavine
Association
CPG2-12 p. 66

31b. Thicketleaf peavine absent.

Ponderosa/bitterbrush/sedge
Association
CPS2-15 p. 16

or Lodgepole/bitterbrush/sedge
Association
CLS2-12 p. 44

(In highly disturbed stands
these two communities can be
separated by size and species of
stumps, or topographic position.
CLS2-12 occurs on lower third to
bottom slope positions of local
topography).

30b. Topography is flat to concave basins or elevated
benches.

Lodgepole/sedge-needlegrass basins
Association
CLG4-13 p. 43

17b. Long stolon sedge rare or absent. Western needlegrass, squirreltail,
or pinegrass present and usually dominants.

32a. Pinegrass present. Stands found commonly on Sisters RD and less so
on Bend RD.

33a. Any two of following species present: snowbrush, chinkapin,
greenleaf manzanita.

Mixed conifer (ponderosa)/snowbrush-
chinkapin/pinegrass
Community type
CWC2-12 p. 74

33b. Any two of following shrubs absent: snowbrush, chinkapin,
greenleaf manzanita.

Mixed conifer (ponderosa)/snowberry
/pinegrass
Community type
CDS6-14 p. 76

32b. Pinegrass absent. Location various. Western needlegrass is domi-
nant herbaceous species.

34a. Twinflower and/or trailing blackberry present. Stands found on
Sisters RD.

Mixed conifer/snowberry/forb
Association
CDS6-13 p. 77

34b. Twinflower and trailing blackberry absent. These associations
difficult to distinguish in the very early seral stage when
major shrubs are not present. Landform characteristics are the
most distinguishing attributes.

35a. Snowbrush present. White fir can be present, at least in tree understory layer.

36a. Stands typically located on buttes, ridge sideslopes and escarpments with convex microrelief and slope gradients exceeding 25 percent.

37a. Golden chinkapin as germinants or older mature plants.

Mixed conifer/snowbrush-chinkapin
Association
CWH1-11 p. 73

37b. Golden chinkapin absent.

Mixed conifer/snowbrush-mazanita
Association
CWS1-12 p. 70

36b. Stands found on plateaus and ridge sideslopes with slope gradients less than 30 percent, and flat to slightly concave or convex microrelief.

38a. Pinemat manzanita present. Stands generally above 5700 feet elevation.

Mixed conifer/snowbrush
Association
CWS1-14 p. 67

38b. Pinemat manzanita absent. Stands generally below 5700 feet elevation.

Mixed conifer/snowbrush-manzanita
Association
CWS1-12 p. 70

or Lodgepole/snowbrush-manzanita
Community type
CLS9-11 p. 45

or Ponderosa/bitterbrush-snowbrush/
needlegrass
Association
CPS3-11 p. 62

(The main difference between these three communities is the location of CLS9-11 and CPS3-11 on undulating flat to concave topography at lower-third to bottom positions while CWS1-12 occurs on convex microrelief at mid-third slope positions and above. CLS9-11 is a successional stage of CWS1-12 on flat topography. CPS3-11 has bitterbrush as a codominant where the species is always subordinate in other two communities.)

35b. Snowbrush absent. White fir rarely present.

39a. Bitterbrush present. Stands below 4800 feet elevation, generally distributed across the pumice subregion.

40a. Soils derived from airlaid rhyolite pumice gravels from Newberry Caldera or these white-gray gravels obvious on the soil surface. Stands restricted to Ft. Rock RD.

41a. Least lupine or big sagebrush common.

Lodgepole/sagebrush (rhyolite)
Association
CLS1-12 p. 36

or Ponderosa/bitterbrush-
sagebrush/squirreltail
(rhyolite)
Association
CPS1-12 p. 55

(These two communities can be separated by the size and species of tree stumps or topographic position. CLS1-12 is in basins and flats while CPS1-12 is on knolls, ridges, and slopes.)

41b. Least lupine and big sagebrush subordinate or absent.

Lodgepole/bitterbrush
(rhyolite)
Association
CLS2-16 p. 38

or Ponderosa/bitterbrush/squirreltail
(rhyolite)
Association
CPS2-18 p. 54

(These two communities can be separated by size and species of tree stumps or topographic position. CLS2-16 is in basins and flats while CPS2-18 occurs on more elevated ground.)

40b. Soils derived from airlaid or flow pumice from Mt. Mazama. Pumice gravels are buff yellow, yellow-brown or pink.

42a. Stands occur in lower third to bottom slope positions of plateaus or basins.

43a. Strawberry or any two of following species present: princespine, yarrow, horkelia, small-flower penstemon.

Lodgepole/bitterbrush/forb
Association
CLS2-13 p. 35

43b. Strawberry or any two of following species absent: princespine, yarrow, horkelia, small-flower penstemon. Pussypaws, sulfur-flowered buckwheat and hoary aster common.

Lodgepole/needgrass basins
Association
CLG3-11 p. 42

42b. Stands in lower third to mid-third slope positions of plateaus, escarpments and drainages.

44a. Squaw currant at least codominant with bitterbrush within 3 to 5 years following disturbance.

Lodgepole/currant-bitterbrush/
needlegrass

Community type

CLS2-15 p. 41

44b. Squaw currant rare, if present at all, even following disturbance.

45a. Greenleaf manzanita present with canopy cover exceeding 5 percent.

Ponderosa/bitterbrush-manzanita/
needlegrass

Association

CPS2-13 p. 61

45b. Greenleaf manzanita absent or less than 5 percent canopy cover.

46a. Woolly wyethia present. Stands located in Black Hills Bly RD.

Ponderosa/wooly wyethia
Association

CPF1-11 p. 60a

46b. Woolly wyethia absent. Stands of more general distribution.

Ponderosa/bitterbrush/needlegrass
Association

CPS2-12 p. 60

or Lodgepole/bitterbrush/needlegrass
Association

CLS2-11 p. 40

(CPS2-12 can be separated from lodgepole communities by the size and species of tree stumps. Stands with more than 40 to 50 sq. ft. basal area in ponderosa stumps should be considered a ponderosa pine site).

39b. Bitterbrush absent. Stands found generally above 4800 elevation.

47a. Greenleaf and/or pinemat manzanita present.

Mixed conifer/manzanita
Association

CRS1-11 p. 72

or Lodgepole/manzanita
Association

CLS3-11 p. 50

(These two communities can not be separated based upon topography. Size and species of tree stumps is the most diagnostic criteria. CRS1-11 is dominated by Shasta red fir with mountain hemlock at higher elevations. CLS3-11 is exclusively lodgepole pine).

47b. Greenleaf and/or pinemat manzanita present.

48a. Linanthastrum present.

Lodgepole/needlegrass-lupine-
linanthastrum
Association
CLG3-13 p. 49

48b. Linanthastrum absent.

49a. Grouse huckleberry present.

Lodgepole/grouse huckleberry
Community type
CLS4-12 p. 51

or Mountain hemlock/grouse
huckleberry
Association
CMS1-11 p. 80

(Both communities can occur on
the same topography, CLS4-12 is
seral to CMS1-11. However,
CLS4-12 can be very persistent
on flat to undulating microre-
lief at lower third slope
positions).

49b. Grouse huckleberry absent.

50a. Beargrass present, tailcup lupine absent.

Lodgepole/beargrass
Association
CLM4-11 p. 52

50b. Beargrass absent, tailcup lupine present.

Lodgepole/needlegrass-lupine
Association
CLG3-14 p. 48

SUCCESSIONAL STATUS OF VARIOUS TREE SPECIES WITHIN CENTRAL OREGON PLAN ASSOCIATIONS

Series	Ecoclass	Association or Community	Type	Western Juniper	Lodgepole Pine	Ponderosa Pine	Sugar Pine	Incense Cedar	Western Larch	Douglas-fir	Western White Pine	Engelmann Spruce	White Fir	Pacific Silver Fir	Noble Fir	Shasta Red Fir	Mountain Hemlock	Subalpine Fir	Whitebark Pine	Quaking Aspen
Western juniper	CJS3-11	JUOC/PUTR/Bunchgrass	A	C		s		s												s
Lodgepole pine	CLM1-11	PICO/sedge-grass wetland	A		C							s	s				s			s
	CLM3-11	PICO/blueberry/forb wetland	A		C							s	s				s			s
	CLM2-11	PICO/ARUVUR	A		C		s						s							s
	CLS2-13	PICO/PUTR/forb	A		C		s						s							
	CLS2-12	PICO/ARTR (Rhyolite)	A		C		s													
	CLS1-11	PICO/ARTR/FEID	A		C		s													
	CLS2-16	PICO/PUTR (Rhyolite)	A		C		s													
	CLS2-11	PICO/PUTR/STOC	A		C		s													
	CLS2-15	PICO/RICE-PUTR/STOC	A		C		s							S						
	CLG3-11	PICO/STOC basins	A		C		s													
	CLG4-13	PICO/CAPE5-STOC basins	A		C		s				s		s				s			
	CLS2-12	PICO/PUTR/CAPE5	A		C		s						s				s			
	CLS9-11	PICO/CEVE-ARPA	CT		S		c						C							
	CLG4-11	PICO/CAPE5-LULA	A		C		s				s		s				S		s	
	CLG4-12	PICO/CAPE5-LULA-PEEU	CT		S		s						C					s		
	CLG3-14	PICO/STOC-LUCA	A		C						s		c					S		C
	CLG3-13	PICO/CAPE5-LUCA-LINU	A		C		s						c					s		
	CLS3-11	PICO/ARNE	A		C						s		c				s		C	
	CLS4-12	PICO/VASC	CT		S									c						
	CLM4-11	PICO/XETE	CT		S		s				s		c		c		c		c	
Ponderosa pine	CPS2-16	PIPO/PUTR/Bunchgrass	A	s		C				c										
	CPS2-18	PIPO/PUTR/SIHY (Rhyolite)	A		s	C														
	CPS1-12	PIPO/PUTR-ARTR/SIHY (Rhyolite)	A	S	s	C														
	CPS1-11	PIPO/PUTR-ARTR/FEID	A	S	s	C														
	CPS2-11	PIPO/PUTR/FEID	A	c	S	C														

Footnote Key: C= Major climax c= Minor climax S= Major seral s= Minor seral A= Association status CT= Community Type status

SUCCESSIONAL STATUS OF VARIOUS TREE SPECIES WITHIN CENTRAL OREGON PLAN ASSOCIATIONS

Series	Ecoclass	Association or Community Type	Western Juniper	Lodgepole Pine	Ponderosa Pine	Sugar Pine	Incense Cedar	Western Larch	Douglas-fir	Western White Pine	Engelmann Spruce	White Fir	Pacific Silver Fir	Noble Fir	Shasta Red Fir	Mountain Hemlock	Subalpine Fir	Whitebark Pine	Quaking Aspen
Ponderosa pine	CPS2-17	PIPO/PUTR-ARPA/FEID	A	s	C	C													
	CPS3-14	PIPO/PUTR-CEVE/FEID	CT	s	S							C							
	CPFI-11	PIPO/WYMO	A	s	C		s					C							
	CPS2-12	PIPO/PUTR/STOC	A	s	C		C		s			C							
	CPS2-13	PIPO/PUTR-ARPA/STOC	A	s	C		C	s	S			C							
	CPS3-11	PIPO/PUTR-CEVE/STOC	A	s	C		C					C							
	CPS2-15	PIPO/PUTR/CAPE5	A	s	C		C					C							
	CPS2-14	PIPO/PUTR-ARPA/CAPE5	A	s	C		C					C							
	CPS3-12	PIPO/PUTR-CEVE/CAPE5	CT	s	C							C							
White fir	CPG2-12	PIPO/CAPE5-FEID-LALA	CT	s	C							C		s					
	CWS1-14	Mixed Conifer/CEVE	A	S	S							C							
	CWS1-15	Mixed Conifer/CEVE/CAPE5	A	S	C	s						C			C				
	CW 2-13	Mixed Conifer/CEVE/CAPE5																	
		-PTAQ	A		S		s	s	C			C							
	CWS1-12	Mixed Conifer/CEVE-ARPA	A		C	C	s		C			C							
	CWS1-13	Mixed Conifer/ARPA-CEVE/CAPE5-PEEU	A	S	S	s	C		C			C							
	CWH1-11	Mixed Conifer/CEVE-CACH	A		S	S			C			C			C				
	CWC2-12	Mixed Conifer/CEVE-CACH/CARU	A		S		C	S	C			C							
	CWC2-11	Mixed Conifer/CEVE-CACH/PTAQ	A		S		s		C			C							
	CDS6-14	Mixed Conifer/SYAL/CARU	A		S		s		C			C							
	CDS6-13	Mixed Conifer/SYAL/FORB	A		S			s	C		s	C	C						
	CDS6-12	Mixed Conifer/SYAL/LIBO																	
		Flatlands	A		s		s	s	C	s	C	C					s		
	CWS9-11	PIEN/Bottomlands	CT	S					S			C							
Shasta red fir	CRS1-11	Mixed Conifer/ARNE	A	S	s	s				S		C			C	s			
Mountain hemlock	CMS1-11	TSME/VASC	A	S						s					C	C	s	s	

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